GASTROENTEROLOGY

ABSTRACTS AND CITATIONS

NATIONAL INSTITUTE OF ARTHRITIS, METABOLISM, AND DIGESTIVE DISEASES

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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism and Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

The issuing of GASTROENTEROLOGY ABSTRACTS and CITATIONS under the auspices of the National Institute of Arthritis, Metabolism, and Digestive Diseases will provide a much needed current awareness tool to scientists and will facilitate greater integration of research and clinical efforts in this field. The number and great diversity of publications in the area of gastroenterology makes it imperative that an appropriate service be available to investigators and practitioners so that they may be apprised of progress with a minimum of delay. Our aim is to provide the readers with a readily systematized compilation of current published work. The publication will provide the greatest usefulness if these interested investigators will contribute their ideas and comments for consideration whenever possible.

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The Secretary of the Department of Health, Education, and Welfare has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 30, 1981.

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NOTE

Journal names are abbreviated according to the list of abbreviations used by *Index Medicus*. For journals not covered by *Index Medicus*, the abbreviations (with some modifications) found in *International Standard ISO833, 1974*, are used. The two-letter state abbreviations are based on the United States Postal Service Code.

LANGUAGE ABBREVIATIONS

Afrikaans	Afr.	Georgian	Geo.	Persian	Per.
Albanian	Alb.	German	Ger.	Polish	Pol.
Arabic	Ara.	Greek	Gre.	Portuguese	Por.
Armenian	Arm.	Hausa	Hau.	Pushto	Pus.
Azerbaijani	Aze.	Hebrew	Heb.	Rumanian	Rum.
Belorussian	Bel.	Hindi	Hin.	Russian	Rus.
Bengali	Ben.	Hungarian	Hun.	Serbian	Ser.
Bulgarian	Bul.	Icelandic	Ice.	Slovak	Slo.
Burmese	Bur.	Indonesian	Ind.	Slovene	Slv.
Chinese	Chi.	Interlingua	Int.	Spanish	Spa.
Croatian	Cro.	Italian	Ita.	Swahili	Swa.
Czechoslovakian	Cze.	Japanese	Jpn.	Swedish	Swe.
Danish	Dan.	Kirghiz	Kir.	Tagalog	Tag.
Dutch	Dut.	Korean	Kor.	Tamil	Tam.
English	Eng.	Latin	Lat.	Telugu	Tel.
Esperanto	Esp.	Latvian	Lav.	Thai	Tha.
Estonian	Est.	Lithuanian	Lit.	Turkish	Tur.
Finnish	Fin.	Marathi	Mar.	Ukranian	Ukr.
Flemish	Fle.	Masai	Mas.	Urdu	Urd.
French	Fre.	Multilingual	Mlt.	Vietnamese	Vie.
Gaelic	Gae.	Norwegian	Nor.	Welsh	Wel.

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone	ml, µl	milli-, microliter(s)
ADP	adenosine diphosphate	mm	millimeter(s)
AMP	adenosine monophosphate	mOsm	milliosmolar; milliosmeter(s)
amp	ampere	msec	millisecond(s)
ATP	adenosine triphosphate	mV	millivolt(s)
A	angstrom	min	minute(s)
BSP	sulfobromophthalein	MTD	maximum tolerated dose
C	degrees centigrade	NAD	nicotinamide adenine dinucleotide
cal	calories	NADH	reduced nicotinamide adenine dinucleotide
cc	cubic centimeter		
cm	centimeter(s)	NADP	nicotinamide adenine dinucleotidephosphate
dl	deciliter		
DNA	deoxyribonucleic acid	NADPH	reduced nicotinamide adenine dinucleotidephosphate
ED_{50}	median effective dose(s)		
EDTA	ethylenediamine tetraacetic acid	ng	nanogram (10^{-9})
e.g.	for example	nm	nanometer(s)
EEG	electroencephalogram	Pa	ambient pressure
ESR	erythrocyte sedimentation rate	PAS	periodic acid - Schiff
g	gram(s)	pg	picogram (10^{-12})
µg	microgram(s)	pgEq	picogram equivalent(s)
Hz	Hertz	p.o.	orally
hr	hour(s)	ppb	parts per billion
Ig	immunoglobulin(s)	ppm	parts per million
i.m.	intramuscular	r	Roentgen
i.p.	intraperitoneal	RBC	red blood cells (erythrocytes), red blood count
IU	international unit(s)		
i.v.	intravenous	resp.	respectively
kcal	kilocalorie(s)	RNA	ribonucleic acid
kg	kilogram(s)	s.c.	subcutaneous
K_m	Michaelis constant	sec	second(s)
LD_{50}	median lethal dose(s)	SGOT	serum glutamic-oxalacetic transaminase
LDH	lactic acid dehydrogenase		
m	meter(s)	SGPT	serum glutamic-pyruvic transaminase
M	molar; mole(s)		
mM	millimolar; millimole(s)	U	unit(s)
µM	micromolar; micromole(s)	UV	ultraviolet
ma	milliampere(s)	V	volt
mCi, µCi	milli-, microcurie(s)	WBC	white blood cells (leukocytes), white blood count
mEq	milliequivalent(s)		
mg	milligram(s)	yr	year(s)

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

5067 THE ELECTRON MICROSCOPY OF NORMAL HUMAN OESOPHAGEAL EPITHELIUM. (Eng.) Hopwood, D.; Logan, K. R.; Bouchier, I. A. D. (Ninewells Hosp. and Medical Sch., Dundee DD2 1UB, Scotland). *Virchows Arch. B [Cell Pathol.]* 26(4):345-358; 1978.

Biopsy specimens from the endoscopically normal human esophagus were examined ultrastructurally to better understand the function of the esophageal epithelium and to compare it with other non-keratinizing stratified squamous epithelium. Three layers were identified, as in light microscopy of the esophageal epithelium: basal, prickle, and functional cell layers. A continuous basement membrane separated the lamina propria from the basal cells. The basal cell membrane carried hemidesmosomes, desmosomes, and microvillous processes. Their cytoplasm contained the usual organelles plus free ribosomes and tonofibrils. Prickle cells contained glycogen rosettes and many tonofilaments, and their cell membranes had many microvillous and desmosomal processes, in places elaborated into desmosome fields. In both these layers, there was a wide intercellular space containing some particulate and membranous debris. The flattened cells of the functional layer had fewer desmosomes and microvilli but abundant glycogen and tonofilaments and a narrow intercellular space. Membrane-coating granules, first reaching a maximum in the functional cell layer, appeared in the upper prickle-cell layer, and a few persisted into the surface cells. The apical cell membrane of the most superficial cells was thickened and had few small microvillous processes, which were covered with a filamentous "fuzzy" coat. No keratohyaline granules were present. The papillae of the lamina propria contained capillaries, some with a fenestrated endothelium. The human esophageal epithelium is similar to other stratified squamous nonkeratinizing epithelia, presumably reflecting a similar wear-and-tear function. Some unique features of it not previously described are the desmosome fields, the lipid droplets, and the fenestration of the capillaries. The structure and distribution of the membrane-coating granules suggest that their contents are secreted into the intercellular space.

5068 THE SPIRAL CONSTRICTOR OF THE GASTRO-ESOPHAGEAL JUNCTION. (Eng.) Jackson, A. J. (Wayne State Univ. Sch. Medicine, Detroit, MI 48201). *Am. J. Anat.* 151(2):265-?75; 1978.

To determine the mechanism by which the normal gastroesophageal junction prevents gastric regurgitation, the gastroesophageal region was reconstructed from the histological analyses of five human neonates. In addition, the musculature of eight (3 newborn and 5 adult) human stomachs obtained from autopsies, with the lower one-third of the esophagus attached, was dissected with the aid of a binocular dissecting microscope. The muscularis mucosae, in the region of the gastroesophageal junction, exhibited no increase in thickness, nor was there any indication of special mucosal folds. In addition, the gastroesophageal junction contained no morphologic evidence to support the existence of an anatomic sphincter (a localized thickening of circular muscle fibers). However, the obliquely arranged inner circular muscle fibers of the esophagus separated into fascicular bundles below the esophageal opening. Some of the fasciculi, as they descended, again became circular in shape and continued into the stomach, forming the middle circular muscle layer, while other fasciculi maintained their oblique course toward the left surface of the esophagus. These fasciculi, coursing on the anterior and posterior surfaces of the esophagus, crossed and interdigitated along the left surface of the esophagus in the region of the incisura cardiaca. After crossing, the oblique fasciculi descended into the stomach forming the inner oblique muscle layer. Based upon this description of crossing and interdigitating fasciculi, it is suggested that closure of the gastroesophageal junction may be due to contraction of spirally arranged muscle. Since the term "sphincter" generally implies a circular structure, it is proposed that the term "spiral constrictor" be considered in naming this anatomical arrangement.

5069 A QUALITATIVE AND QUANTITATIVE MORPHOLOGIC STUDY OF PEYER'S PATCHES OF THE MOUSE. (Eng.) Abe, K.; Ito, T. (Hokkaido Univ. Sch. Medicine, Sapporo, 060 Japan). *Arch. Histol. Jpn.* 40 (5):407-420; 1977.

The morphology of Peyer's patches of adult mice was studied qualitatively and quantitatively by light microscopy, to determine whether they are functionally related to peripheral lymphatic tissues. The patch was seen to be topographically divided into four portions: germinal center, follicular area, parafollicular area, and dome area. The germinal center consisted of light and dark zones. The follicular area surrounded the germinal center, especially the light zone that had an apical pole directed toward the mucosal surface. The parafollicular area surrounded the follicular area and contained postcapillary venules with high endothelium. The dome area was situated just above the follicular area. The epithelium over the dome area was infiltrated with numerous lymphocytes. Quantitatively, the germinal center, follicular area, and parafollicular area were almost similar in volume (about 30% each), and the dome area constituted only a small portion (about 10%). The density of small lymphocytes was highest in the follicular area and lowest in the germinal center. Of the total small lymphocytes in the patch, 8.4% were included in the germinal center, 58.2% in the follicular area, 26.7% in the parafollicular area, and 3.8% in the dome area. Intraepithelial small lymphocytes were almost twice as abundant in the dome as in the villi. In the dome, almost half the intraepithelial lympho-

cytes were above the nuclear level of the epithelial cells, whereas in the villi 7.3% of intraepithelial lymphocytes were above the nuclear level. The results suggest that the functional structure of the Peyer's patch is similar to that of peripheral lymphatic tissues.

5070 THE CELLS OF THE RAT GASTRIC GROOVE AND CARDIA: AN ULTRASTRUCTURAL AND CARBOHYDRATE HISTOCHEMICAL STUDY, WITH SPECIAL REFERENCE TO THE FIBRILLOVESICULAR CELLS. (Eng.) Wattel, W.; Geuze, J. J. (Abelenlaan 4, Middleburg, Netherlands). *Cell Tissue Res.* 186(3):375-391; 1978.

The cells of the rat gastric groove and cardia, with particular reference to the fibrillovesicular cells (FVC), were studied using a carbohydrate histochemical stain, an extracellular space marker, ultrastructural stereoscopy, and ^{3}H-thymidine. The distal wall of the groove between the forestomach and glandular stomach is lined with a special type of columnar cell (CCGG) and with FVC. The cardiac glands contain cardiac mucous (CMC) and serous cells (CSC). The CCGG contain small mucous granules and special vesicles and tubules. The CMC are filled with large mucous granules and resemble mucous neck cells. The CSC are filled with large proteinaceous granules. The FVC are characterized by long microvilli, apical bundles of microfilaments and a complex "tubulovesicular system." The pattern of ^{3}H-thymidine incorporation and the presence of immature and transitional forms indicate a possible origin of all the cell types concerned from a common undifferentiated precursor. The membranes of the tubulovesicular system of FVC as well as the apical cell membrane were reactive to Thiery's carbohydrate stain. However, lanthanum tracing of the extracellular space and ultrastructural stereoscopy did not reveal a permanent continuity between both membrane systems. The absence of ^{3}H-thymidine label showed that FVC were not proliferative. The structural characteristics of FVC do not account for a secretory, resorptive, or receptive function. The special arrangement of microfilaments and the tubulovesicular system suggests an ability for fast changes in surface area.

5071 EFFECT OF BILATERAL NEPHRECTOMY ON ENDOCRINE CELLS OF RAT STOMACH. (Eng.) El Munshid, H. A.; Sundler, F.; Hakanson, R. (Dept. Physiology, Univ. Khartoum, Khartoum, Sudan). *Scand. J. Gastroenterol.* 12(7):849-856; 1977.

In an effort to discover why the histamine-storing endocrine-like cells in the oxyntic gland area of nephrectomized rats respond to the ensuing hypergastrinemia while the parietal cells do not, the morphological and ultrastructural effects of bilateral nephrectomy were investigated in the histamine-containing cells, gastrin (G) cells, and parietal cells of 16 adult male Wistar rats. The animals were sacrificed 18-48 hr after nephrectomy or sham-operation, and sections from the oxyntic and pyloric gland areas were taken for analysis. Under the fluorescence microscope, the enterochromaffin-like cells were reduced in number ($p<0.001$), corresponding to a significant lowering of gastric mucosal histamine content (from 60 µg to 48 µg, $p<0.001$). The number of enterochromaffin cells and G cells was not affected, nor was the 5-hydroxytryptamine (5-HT) content. Electron micrographs indicated that the two major cell populations comprising the histamine-containing enterochromaffin-like cells of the oxyntic mucosa, the A-like cells (with round, electron-dense cytoplasmic granules), and the ECL cells (with granules of vesicular appearance) were increased in size while the number of cytoplasmic granules per unit area was decreased following nephrectomy. G cells in the antrum became smaller while the number of cytoplasmic granules per unit area increased, and the parietal cells showed almost complete loss of canaliculi but numerous vehicles in the cytoplasm. These results support the theory that ECL and A-like cells are activated following nephrectomy while the parietal and G cells are deactivated.

5072 IMMUNOELECTRON CYTOCHEMICAL LOCALIZATION OF MOTILIN IN HUMAN DUODENAL ENTEROCHROMAFFIN CELLS. (Eng.) Heitz, P. U.; Kasper, M.; Krey, G.; Polak, J. M.; Pearse, A. G. E. (Dept. Pathology, Univ. Basel, Schonbeinstrasse 40, CH-4056 Basel, Switzerland). *Gastroenterology* 74(4):713-717; 1978.

The precise localization of motilin in the human duodenal mucosa was studied ultrastructurally. The 22-amino acid peptide motilin was localized exclusively in the duodenal type of enterochromaffin cell by immunoelectron microscopy. This cell was seen to occur predominantly in the duodenum and upper jejunum. It is concluded that at least two types of enterochromaffin cells exist in the human gut mucosa and that they produce at least one biogenic amine as well as two peptides. Therefore, they could provide a useful model for studies of the interrelationship of storage and release of amines and peptides.

5073 EFFECT OF ETHANOL ON THE MORPHOLOGY OF HAMSTER JEJUNUM. (Eng.) Fox, J. E.; McElligott, T. F.; Beck, I. T. (Queen's Univ., Hotel Dieu Hosp., Kingston, Ontario K7L 3H6, Canada). *Am. J. Dig. Dis.* 23(3):201-209; 1978.

To study the morphological effects of exposure of the jejunum to low ethanol concentrations, rat and hamster jejuna were perfused with 2.1-4.8% ethanol. Following 45 min of exposure, many of the villi of the hamster jejunum developed fluid-filled blisters. Perfusion with mannitol (150-1,050 mM) caused necrosis of the villus tips due to dehydration but no blister formation. The rat jejunum was less resistant to ethanol than was that of the hamster, and in this case, the blisters ruptured. The authors believe that the initial insult of the freely permeant ethanol is deep in the epithelium, resulting in accumulation of edema under the epi-

thelium. Solutions of relatively inert substances are poor controls for experiments on ethanol-induced injury.

5074 AN IN VITRO STUDY OF PANCREATIC DUCTAL CELLS. (Eng.) Singh, M.; Parks, N. M.; Webster, P. D., III (Veterans Admin. Hosp., Augusta, GA 30904). *Proc. Soc. Exp. Biol. Med.* 157(1):23-28; 1978.

Since extensive metabolic or biochemical characterization of pancreatic ductal cells has not been carried out, selected metabolic parameters were examined in the pancreatic duct of fed and fasted rats after they were killed. The intact duct was isolated by dissection and opened longitudinally. Twelve ducts were pooled for each study. Fasting for 72 hr was associated with decreases in ^{14}C-glucose oxidation to $^{14}CO_2$ ($p<0.05$ in terms of protein, $p<0.005$ in terms of DNA) and alkaline phosphatase activity ($p<0.005$ in terms of protein, $p<0.05$ in terms of DNA). There were no changes with fasting in the following parameters: protein, RNA, or DNA content; ^{14}C-labeled amino acid incorporation into proteins; ^{14}C-glucose or ^{14}C-glucosamine incorporation into glycoproteins; and Mg^{2+}-ATPase, HCO_3^--ATPase, 5'nucleotidase, or leucine aminopeptidase activities. In contrast to acinar cells, duct cells did not actively synthesize proteins. This study points out that pancreatic duct cells are metabolically active and that fasting was associated with reductions in glucose oxidation and alkaline phosphatase activity. Whether these metabolic activities are under the control of gastrointestinal hormones remains to be determined.

5075 THE MORPHOLOGY OF THE GASTROINTESTINAL TRACT. (Eng.) Teague, R. H. (Bristol Royal Hosp., Bristol BS2 8HW, England). *Adv. Exp. Med. Biol.* 89:51-60; 1977.

5076 MAST CELL POPULATION IN STOMACH WALL WITH EXPERIMENTALLY INDUCED PEPTIC ULCER. (Eng.) Chatterjee, S.; Roy, P. R.; Dasgupta, S. R. (Univ. Coll. Medicine, Calcutta Univ., Calcutta, India). *Indian J. Exp. Biol.* 14:100-102; 1976.

5077 MORPHOFUNCTIONAL CONSIDERATIONS ON THE ELASTIC FIBERS OF THE TERMINAL ILEUM SEGMENT IN HUMAN NEWBORN. (Eng.) de Carvalho, C. A. F.; Faintuch, J. J.; Rodrigues Junior, A. J. (Faculdade de Medicina da Universidade de Sao Paulo, Av. Dr. Arnaldo, 455, 01246, Sao Paulo, Brazil). *Arq. Gastroenterol.* 14(3):131-134; 1977.

5078 MUCOSUBSTANCES IN THE NORMAL HUMAN OESOPHAGEAL EPITHELIUM: A COMPARISON OF PERIODIC ACID-SILVER AND PHOSPHOTUNGSTIC ACID TECHNIQUES. (Eng.) Hopwood, D.; Logan, K. R.; Milne, G. (Ninewells Hosp. and Medical Sch., Dundee DD2 1UB, Scotland). *Histochemistry* 54(1): 67-74; 1977.

5079 Escherichia coli IN THE FAECAL FLORA OF MAN. (Eng.) Hartley, C. L.; Clements, H. M.; Linton, K. B. (Medical Sch., Univ. Bristol, Bristol BS8 1TD, England). *J. Appl. Bacteriol.* 43(2):261-269; 1977.

5080 MICROBIAL EFFECTS ON MUCOSAL STRUCTURE AND FUNCTION. (Eng.) Abrams, G. D. (Univ. Michigan Medical Sch., Ann Arbor, MI 48109). *Am. J. Clin. Nutr.* 30(11):1880-1886; 1977.

5081 REVIEW OF LIGHT AND ELECTRON MICROSCOPY OF THE GASTRIC MUCOSA. (Fre.) Zeitoun, P. (U.E.R. de Medecine, B.P. 171, 51056 Reims-Cedex, France). *Ann. Gastroenterol. Hepatol.* 13(5):467-477; 1977.

5082 THE STRUCTURE OF THE GASTRIC MUSCULAR MEMBRANE IN DIFFERENT PARTS OF THE STOMACH. (Rus.) Dvoretskaja, M. G. (Dept. Anatomy, N. A. Semashko Moscow Medical Inst. Stomatology, Moscow, USSR). *Arkh. Anat. Gistol. Embriol.* 72(4): 25-32; 1977.

5083 NATURE AND SIGNIFICANCE OF CAJAL'S "INTESTINAL CELLS" IN THE ESOPHAGUS AND STOMACH OF MAN. (Ita.) Faussone Pellegrini, M. S.; Cortesini, C.; Romagnoli, P. (Istituto di Istologia ed Embriologia generale dell'Universita di Firenze, Florence, Italy). *Boll. Soc. Ital. Biol. Sper.* 52(21):1764-1767; 1977.

5084 ULTRASTRUCTURAL PICTURE OF MYONEURAL JUNCTIONS IN THE HUMAN ESOPHAGUS AND STOMACH. (Ita.) Faussone Pellegrini, M. S.; Cortesini, C.; Romagnoli, P. (Istituto di Istologia ed Embriologia generale dell'Universita di Firenze, Florence, Italy). *Boll. Soc. Ital. Biol. Sper.* 52(21):1768-1770; 1977.

5085 MORPHOLOGICAL AND FUNCTIONAL STUDY OF INTESTINAL VILLI. (Spa.) Martinez Ramos, C.; Romero Martinez, A. (Facultad de Medicina, Universidad Complutense, Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 51(6):643-658; 1977.

5086 MORPHOFUNCTIONAL ANALYSIS OF THE CONDITION OF THE SMALL INTESTINE FOLLOWING SUBDIAPHRAGMATIC VAGOTOMY. (Rus.) Eletskii, Iu. K.; Tsibulevskii, A. Iu. (Dept. Histology, N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Eksp. Khir. Anesteziol.* (5):34-38; 1976.

5087 ANATOMIC-SURGICAL FOUNDATION OF DIRECTED LIVER RESECTION. (Ita.) Monti, G. F.; Sasso, F. (Istituto di Clinica Chirurgica dell' Universita, Trieste, Italy). *Minerva Med.* 68(31): 2159-2166; 1977.

See also, 5132, 5155, 5156, 5188, 5268, 5272, 5273, 5276, 5289, 5318, 5461, 5619, 5783, 5785.

5088 CAPACITY OF THE HUMAN COLON TO ABSORB FLUID. (Eng.) Debongnie, J. C.; Phillips, S. F. (Mayo Clinic, Rochester, MN 55901). *Gastroenterology* 74(4):698-703; 1978.

To measure the maximum amount of fluid that can be absorbed by the normal human colon, four healthy subjects were studied by metabolic balance. When, in addition to normal dietary intakes, 2 l/day of isotonic fluid were infused into the cecum, fecal weight increased 150%, but the frequency of stools increased only slightly. Fecal weight, percentage of water, and frequency increased more when the load of fluid infused into the cecum was 4 l/day and achieved values found in diarrhea. Under these circumstances, summing the estimated endogenous ileal flow (approximately 2 l/day) and the infused load, minus the fecal losses, a net maximum absorption of 5,700 ml of H_2O, 816 mEq of Na, and 44 mEq of K was calculated. In a second set of studies, chenodeoxycholate (approximately 4 g/day) was infused into the cecum, along with a fluid load of 4 l/day. Water and sodium absorptions were reduced to approximately 5,000 ml and 700 mEq, resp., and diarrhea occurred. Ursodeoxycholate administered in the same way did not alter stool composition or cause diarrhea. Infusion of a single bolus of 250 ml of fluid into the cecum did not alter stool composition; a bolus of 500 ml produced loose stools. Thus, the colon has a surprisingly large capacity to absorb fluid; this capacity is reduced by chenodeoxycholate and is overwhelmed if fluid enters the cecum rapidly. The approach of nonsteady state infusions into the cecum may be useful for the study of colonic function and diarrhea.

5089 TISSUE OSMOLALITY IN INTESTINAL VILLI DURING LUMINAL PERFUSION WITH ISOTONIC ELECTROLYTE SOLUTIONS. (Eng.) Jodal, M.; Hallblack, D. A.; Lundgren, O. (Dept. Physiology, Univ. Goteborg, Goteborg, Sweden). *Acta Physiol. Scand.* 102 (1):94-107; 1978.

The hypothesis that a muscular countercurrent exchanger in the intestinal villi acts as a countercurrent multiplier that creates a hyperosmolar compartment necessary for water absorption in the absence of or against a lumen to plasma osmolality difference was examined using a cryoscopic technique. Tissue osmolality in the core of the intestinal villi of cats was determined in intestinal mucosa segments exposed to either Krebs-glucose, Krebs-mannitol, or cholin-mannitol, and then rapidly extirpated and frozen. Cross-sections of the intestinal wall were cut at different levels of the villi, and the tissue was subsequently thawed by perfusion to determine the tissue melting point (the point at which the last ice crystal melted, taken as a measure of the extracellular osmolality). The results of the melting experiments suggest that there is a region at the villous tip that has a considerably higher osmolality than that of the fluid perfusing the intestinal lumen or that of plasma and that there exists an osmolality gradient within the villus from its tip to its base. The gradient existed on both the jejunum and ileum. Increasing the intestinal blood flow by the intra-arterial administration of isopropylnorepinephrine (20 µg/ml) or making the intestine ischemic by clamping the intestinal vascular supply while supplying oxygen to the mucosa decreased tissue osmolality. Substituting all the sodium ions with choline in the luminal perfusate almost completely abolished the tissue hyperosmolality, and the intestine became a secretory organ. These results are consistent with the view that the observed villous tissue hyperosmolality was created by a countercurrent multiplication of sodium chloride. It is proposed that the hyperosmolar region represents the hyperosmotic compartment necessary for explaining intestinal water absorption.

5090 EXPERIMENTAL STUDIES ON FLUID PATHOPHYSIOLOGY IN SMALL INTESTINAL OBSTRUCTION IN THE RAT. II. EFFECTS OF INTRALUMINAL HYPEROSMOLALITY AND SIMULTANEOUS INTRAVENOUS INFUSIONS. (Eng.) Johnson, L.; Nordstrom, H.; Nylander, G. (Karolinska Hosp., 104 01 Stockholm 60, Sweden). *Scand. J. Gastroenterol.* 13(1):113-122; 1978.

An experimental model for studying the flow of fluids across the mucosa of the small intestine was used to investigate the pathophysiology of simple obstructional ileus. A hyperosmolal glucose solution (3 ml, about 1,600 mOsm/kg) was introduced into the intestinal lumen of male albino Sprague-Dawley rats through a catheter inserted into an extraperitonealized 50-cm distal loop, and the effects of i.v. infusions (12 ml/hr) of hypo-osmolal (0.45% NaCl, about 145 mOsm/kg), iso-osmolal (0.90% NaCl, about 290 mOsm/kg), and hyperosmolal (30% of glucose, about 1,600 mOsm/kg) solutions on the extent and rate of the resulting intestinal fluid flux were examined. At the end of every 2-hr experimental period, the same volume of fluid had accumulated in all groups and there was a pronounced decrease in osmolality. At 60 min, the intraluminal osmolality had dropped to 500 mOsm/kg in the experimental groups. The final osmolality was 400 mOsm/kg in the experimental groups compared with 455 mOsm/kg in the controls. There was a linear increase in intraluminal pressure in the control, iso-osmolal, and hyperosmolal groups over the 2-hr period, but in the hypo-osmolal group, a peak was reached (30 cm of water) at 1 hr and maintained for the next hour. The final pressure was 40 cm of water in the control group but markedly higher in the iso-osmolal group. A very pronounced hemodilution took place in the hyperosmolal group, representing a hematocrit reduction of 25 U, during the first 30 min and continued at this level for the experimental period. Serum osmolality increased markedly in the control group, iso-osmolal group, and hyperosmolal group but did not increase in the hypo-osmolal group. A significant urinary production occurred only in the hyperosmolal group (12 ± 2.2 ml/hr), corresponding to the volume of infused glucose. In this experimental system, the same amount of fluid accumulated in the rat small intestinal lumen whether hypo- or iso-osmolal glucose was infused, suggesting that the flow of fluid into the lumen cannot be modified by giving parenteral solutions of any osmolality.

5091 EXPERIMENTAL STUDIES ON FLUID PATHOPHYSIOLOGY IN SMALL INTESTINAL OBSTRUCTION IN THE RAT. III. EFFECTS OF INTRALUMINAL ISO-OSMOLALITY AND SIMULTANEOUS INTRAVENOUS INFUSION. (Eng.) Johnson, L.; Nordstrom, H.; Nylander, G. (Karolinska Hosp., 10401 Stockholm 60, Sweden). *Scand. J. Gastroenterol.* 13(2):235-240; 1978.

An experimental model was developed in rats to investigate the accumulation of fluid in the lumen during intestinal obstruction. An immobilized 50-cm loop of male albino rat ileum was extraperitonealized in 90 animals and 3 ml of an iso-osmolal polyethylene-glycol solution (PEG, 290-300 mOsm/kg) was introduced. Intraluminal pressure, blood pressure, urine output, serum osmolality, and blood hematocrit were monitored in three experimental groups in which a constant infusion pump was used to infuse solutions of different osmolality into the jugular vein at the rate of 12 ml/hr: (1) control (no infusion), (2) hypo-osmolal (0.45% NaCl, ≈145 mOsm/kg), and (3) iso-osmolal (0.90% NaCl, ≈290 mOsm/kg). The original volume in the loop, representing the 3 ml of PEG, was essentially unchanged by the i.v. infusions, and the osmolality of the intestinal contents was not changed in any group. However, there was a tendency to a reduction of the intestinal contents in the control group. There was no change in the intraluminal pressure, normal peristaltic activity, or normal blood pressure in any of the groups. No urine output occurred in any of the experiments. A slight but significant ($p<0.05$) hemoconcentration appeared at the end of the experiment in the control group. A significant ($p<0.05$) hemodilution occurred in the first hour in the iso- and hypo-osmolal groups; it was maintained in the hypo-osmolal group but returned to the original value in the iso-osmolal group during the next hour. When parenteral infusions of solutions in amounts equal per hour to total plasma volume were given, arterial and pulse pressures remained stable and blood volume showed only slight changes, measured as a change in the hematocrit. In the iso-osmolal group, the difference in blood volume at the end of the 2-hr experimental period (24 ml of fluid delivered) showed that only 5% of infused fluid remained in the blood, indicating that the rest was distributed to the extravascular space, which must then have an enormous storage capacity. In the hypo-osmolal group, the reduction in blood osmolality indicates that there is a reduction in the osmolality of both the extravascular space and the vascular compartment. It is concluded that the influx of fluid into the intestinal lumen in the presence of a hyperosmolal agent is due entirely to the intense osmotic strength of the solution and that large parenteral infusions of varying osmolality do not affect this accumulation.

5092 CHARACTERIZATION OF p-AMINOBENZOIC ACID TRANSPORT ACROSS THE RAT INTESTINE. (Eng.) Arvanitakis, C.; Longnecker, M. P.; Folscroft, J. (Kansas Univ. Medical Center, Rainbow Blvd. at 39th St., Kansas City, KS 66103). *J. Lab. Clin. Med.* 91(3):467-472; 1978.

The intestinal absorption of para-aminobenzoic acid (PABA) was characterized *in vivo* and *in vitro* in the rat by the segmental intestinal perfusion and everted gut sac technique, and regional differences between jejunal and ileal absorption were examined. Net PABA absorption was directly proportional to substrate concentration, and saturation of absorption did not occur with increasing concentrations of PABA (1-50 mM), indicating a nonsaturable process. Jejunal and ileal absorption rates were similar and were not influenced by the presence of glucose or the absence of sodium in the test solution. Similarly, ^{14}C-PABA transport *in vitro* was nonsaturable and proportional to PABA concentration (0.05, 0.5, 1, 10, and 50 mM). It was not inhibited by ouabain or other PABA analogues such as folic acid and benzoic acid. These studies indicate that PABA, a vitamin B cofactor, is absorbed by a nonsaturable, sodium-independent process, which characterizes passive diffusion and is similar to the absorption of other vitamin B group members.

5093 TRANSPORT OF HETEROCYCLIC ACIDS ACROSS RAT SMALL INTESTINE IN VITRO. (Eng.) Jackson, J. J.; Airall, A. A. (George Washington Univ., Medical Center, 2300 I St., N.W., Washington, DC 20037). *J. Membr. Biol.* 38(3):255-269; 1978.

The steady-state fluxes of barbituric acid, six of its substituted derivatives, and 5,5-dimethyloxazolidinedione (DMO) across the wall of rat jejunum was studied *in vitro*. For each of the compounds tested, the mucosal (M) to serosal (S) flux was significantly larger than the S to M flux. Both M to S and S to M fluxes increased linearly with concentration, and the transport of one acid was not influenced by the presence of a tenfold greater concentration of a second heterocyclic acid. The fluxes decreased as the pH of the incubation saline was increased, but neither the M to S, nor the S to M fluxes could be described in terms of simple nonionic diffusion. The relation between the flux ratios of the transported acids and their pK_a values could be described by an equation derived from consideration of the transport of a weak acid in a series three-compartment system, and it is concluded that the three-compartment system provides a good working hypothesis for the mechanism of heterocyclic acid transport across rat jejunum. The best fit of the theoretical curve to the experimental data was obtained when the ratio of permeabilities to the ionized and nonionized forms of a weak acid at one of the barriers was assigned the value 5×10^{-1}. It is suggested that this value may be characteristic of a noncellular restriction to diffusion, such as a layer of connective tissue, and substantiates previous suggestions that the intermediate compartment of the intestinal three compartment system is a component of the subepithelial extracellular space.

5094 GLUCOSE TRANSPORT BY BRUSH-BORDER MEMBRANE VESICLES AFTER PROXIMAL RESECTION OR ILEO-JEJUNAL TRANSPOSITION IN THE RAT. (Eng.) Menge, H.; Murer, H.; Robinson, J. W. L. (Medi-

zinische Universitatsklinik, D-3550, Marburg/Lahn, W. Germany). *J. Physiol. (Lond.)* 274:9-16; 1978.

To study the functional properties of the ileal mucosa and the mechanisms responsible for the adaptive response of the ileum following jejunal resection or interposition, glucose transport by brush border membrane vesicles was determined after proximal resection or ileo-jejunal transposition in female Wistar rats. Different intestinal regions were removed for the examination of membrane vesicles 4 weeks after operation. The ability of the brush border membranes to accumulate glucose was measured in the presence of a 100-mM NaSCN gradient as driving force, but in the absence of a Na^+ gradient. Vesicles from control ileum developed an overshoot uptake of glucose after 15 sec that was three to four times smaller than that of jejunal vesicles. This difference was also observed in membranes prepared from ileal loop mucosa following proximal resection or interposition in the jejunum. Jejunal vesicles disclosed a considerably smaller overshoot uptake of glucose following interposition below the ileum. The results indicate that the enhancement of the function of the ileum *in vivo* following proximal resection is due primarily to an increase in surface area (a result of the lengthening of villi and crypts due to hyperplasia) and not to any changes in the fundamental properties of the brush border membrane of the individual enterocytes.

5095 EFFECT OF ETHANOL ON GLUCOSE AND WATER ABSORPTION IN HAMSTER JEJUNUM IN VIVO. METHODOLOGICAL PROBLEMS: ANESTHESIA, NONABSORBABLE MARKERS, AND OSMOTIC EFFECT. (Eng.) Fox, J. E.; Bourdages, R.; Beck, I. T. (Hotel Dieu Hosp., Kingston, Ontario, Canada). *Am. J. Dig. Dis.* 23(3): 193-200; 1978.

The effect of ethanol (450-1,050 mM) on glucose and water absorption was studied in the *in vivo* hamster jejunum. In preliminary experiments, using sodium amytal anesthesia, control animals, whose jejunal segment was perfused without ethanol, required more anesthetic agent than did those perfused with ethanol. Thus, to allow for unbiased comparison of the absorption data between the two groups of animals, all absorption studies were carried out on conscious restrained hamsters. Ethanol did not influence the permeability of the jejunum to polyethylene glycol (PEG) and meglumine diatrizoate. In addition, ethanol did not influence the time required for the onset of steady-state absorption. Using both the gravimetric and the electrical methods, no measurable osmotic pressure exerted by ethanol (150-1,050 mM) on the hamster jejunum could be detected. In the absorption studies, perfusion of the jejunum with five increasing concentrations of ethanol (450-1,050 mM) appeared to cause a concentration-dependent depression in steady-state glucose transport. Water transport was depressed only when 4.8% (1,050 mM) ethanol was perfused. The effect of ethanol on the parameters studied is probably not related to the osmolality of the solution.

5096 PROTEIN DIGESTION AND ABSORPTION IN THE RAT. (Eng.) Curtis, K. J.; Kim, Y. S.; Perdomo, J. M.; Silk, D. B. A.; Whitehead, J. S. (Veterans Admin. Hosp., 4150 Clement St., San Francisco, CA 94121). *J. Physiol. (Lond.)* 274:409-419; 1978.

A randomly ^{14}C-labeled protein was synthesized, and the site and rate of digestion and absorption of dietary protein was investigated using this protein in a new method in the rat. A liquid test meal consisting of protein and a nonabsorbable marker, $^{51}CrCl_3$, was administered to rats sacrificed at intervals up to 4 hr after ingestion of the meal. Analysis of intestinal contents showed that as gastric emptying proceeded, the meal moved rapidly to the distal two-thirds of the small intestine. Protein digestion and absorption occurred predominantly in this area over a period of 1 to 2 hr. The amounts of endogenous protein present in the small intestine never exceeded the amounts of exogenous protein during maximum absorption of exogenous protein (0-1 hr). At later time periods (2-4 hr), however, more endogenous than exogenous protein was detected in the intestinal lumen. It is concluded that the digestion and absorption of dietary protein is a rapid process, taking place in the distal two-thirds of the small intestine. Endogenous protein levels do not exceed exogenous protein levels until after the bulk of exogenous protein is absorbed.

5097 EFFECT OF MEDICINAL SUBSTANCES ON INTESTINAL ABSORPTION. (Rus.) Frolkis, A. V.; Bushkova, R. K.; Lotakova, N. N.; Smolianskaia, L. I. (Propedeutic Dept. Internal Medicine, O. V. Kuusinen Petrozavodsk Univ., Petrozavodsk, USSR). *Klin. Med. (Mosk.)* 55(6):76-83; 1977.

5098 TRANSPORT THROUGH THE MEMBRANE OF INTESTINAL CELLS. (Pol.) Krawczyk, M. (Klinika Chirurgii Ogolnej i Plastycznej AM, ul. Banacha la, 02-097 Warsaw, Poland). *Pol. Tyg. Lek.* 32(40): 1575-1576; 1977.

5099 INVESTIGATION OF THE EFFECTS OF VEGETABLE HYDROCOLLOIDS (GUMS) ON INTESTINAL RESORPTION IN EXPERIMENTAL ANIMALS. (Ger.) Forster, H.; Hoos, I. (Zentrum der Biologischen Chemie der Universitat, Theodor-Stern-Kai 7, 6000 Frankfurt/M., W. Germany). *Z. Ernaehrungswiss.* 16(2):140-149; 1977.

5100 DIFFERENTIATION BETWEEN MORBID AND INVOLUTIVE CHANGES IN ENTERAL RESORPTION. COMMUNICATION 2: INVOLUTIVE CHANGES IN ENTERAL RESORPTION. (Ger.) Weiner, R.; Laue, R.; Dietze, F.; Schone, D.; Weiner, C. (I. Chirurgische Klinik des Bezirkskrankenhauses St. Georg Leipzig, Strasse der DSF 141, DDR-7021 Leipzig, E. Germany). *Dtsch. Gesundheitsw.* 32(31):1441-1446; 1977.

5101 VARIATIONS IN THE INTESTINAL ABSORPTION OF GLUCOSE AS A FUNCTION OF AGE. (Ita.)

Angioy, A. M.; Carbini, L.; Padalino, A. (Istituto di Fisiologia Umana dell'Universita di Cagliari, Cagliari, Italy). *Boll. Soc. Ital. Biol. Sper.* 52(21):1778-1781; 1977.

5102 ACTIVE TRANSPORT OF GLUCOSE IN THE SMALL INTESTINE UNDER VARIOUS SURGICAL CONDITIONS. (Rus.) Popov, V. A.; Tuchin, S. V.; Shvyrev, N. I. (Second Surgical Clinic Postgraduate Studies, S. M. Kirov Military Medical Acad., Leningrad, USSR). *Eksp. Khir. Anesteziol.* (5):38-41; 1976.

5103 VARIATIONS IN THE INTESTINAL ABSORPTION OF XYLOSE AS A FUNCTION OF AMBIENT TEMPERATURE. (Ita.) Ciampolini, M. (Istituto di Clinica Pediatrica dell'Universita di Firenze, Florence, Italy). *Minerva Pediatr.* 29(10):687-692; 1977.

5104 VARIATIONS IN INTESTINAL ABSORPTION. II. AGE: ORAL LOAD CURVES WITH XYLOSE. (Ita.) Ciampolini, M.; Adami-Lami Conti, C.; Muzzarelli, D.; Falcini, F. (Istituto di Clinica Pediatrica dell'Universita di Firenze, Florence, Italy). *Minerva Dietol. Gastroenterol.* 23(2):67-70; 1977.

5105 VARIATIONS IN INTESTINAL ABSORPTION. III. ENVIRONMENTAL TEMPERATURE: BLOOD AND URINE XYLOSE LEVELS AFTER AN ORAL TEST IN CHILDREN AND ADULT VOLUNTEERS KEPT AT DIFFERENT TEMPERATURES. (Ita.) Ciampolini, M.; Muzzarelli, D. (Istituto di Clinica Pediatrica dell'Universita di Firenze, Florence, Italy). *Minerva Dietol. Gastroenterol.* 23(2):71-78; 1977.

5106 FACTORS INFLUENCING THE ENTEROHEPATIC DIGITOXIN CIRCULATION IN HUMANS. (Ger.) Sattler, R. W.; Schmiedeberg, W.; Seiler, K. U. (Abteilung Pharmakologie, Christian-Albrechts-Universitat, Hospitalstrasse 4-6, 2300 Kiel, W. Germany). *Arzneim. Forsch.* 27(II, 8):1615-1617; 1977.

5107 IRON ABSORPTION IN THE ELDERLY [Abstract]. (Dut.) Marx, J. J. M. (No affiliation given). *Ned. Tijdschr. Geneeskd.* 121(28):1157; 1977.

5108 ABSORPTION OF VITAMIN B_1. IV. LEVELS OF SH-GROUPS IN INTESTINAL MUCOSA AND ABSORPTION OF ^{33}S-THIAMINE. (Fre.) Lazarov, I. (Institut de Recherches Zootechniques, Kostinbrod-Sofia, Bulgaria). *Acta Vitaminol. Enzymol.* 30(4/6):117-122; 1976.

5109 ABSORPTION OF VITAMIN B_1. V. EFFECT OF A MALE SEXUAL GLAND EXTRACT AND OF 4,4-DIOXYDIPHENYLBEXANE ON THE INTESTINAL ABSORPTION OF THIAMINE. (Fre.) Lazarov, I. (Institut de Recherches Zootechniques, Kostinbrod-Sofia, Bulgaria). *Acta Vitaminol. Enzymol.* 30(4/6):123-129; 1976.

5110 THE EFFECT OF LIPIDS ON TAUROCHOLATE ABSORPTION FROM SMALL INTESTINE IN THE RAT IN VIVO [Abstract]. (Eng.) Roy, C. C.; Lefebvre, D.; Belanger, G.; Chartrand, L.; Weber, A. (Ste-Justine Hosp., Montreal, Quebec, Canada). *Clin. Res.* 25(5):689A; 1977.

5111 THE EFFECT OF VERAPAMIL ON INTESTINAL CALCIUM TRANSPORT. (Eng.) Wrobel, J.; Michalska, L. (Medical Sch., ul. Debinski 1, 80-211 Gdansk, Poland). *Eur. J. Pharmacol.* 45(4): 385-387; 1977.

5112 THE EFFECT OF CALCIUM RESTRICTION IN THE DIET ON CALCIUM TRANSPORT IN RAT SMALL INTESTINE. (Eng.) Michalska, L.; Wrobel, J.; Szczepanska-Konkel, M. (Medical Sch., ul. Debinski 1, 80-210 Gdansk, Poland). *Acta Biochim. Pol.* 23(?/3):109-114; 1976.

5113 SODIUM-COUPLED SOLUTE TRANSPORT BY SMALL INTESTINE: A STATUS REPORT. (Eng.) Schultz, S. G. (Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA 15261). *Am. J. Physiol.* 233(4): E249-E254; 1977.

5114 INTESTINAL ABSORPTION OF AMINO ACIDS AND PEPTIDES. (Eng.) Matthews, D. M. (Westminster Hosp., 124 Vauxhall, Bridge Rd., London SW1V 2RH, England). *Z. Ernaehrungswiss.* 20(Suppl.): 1-7; 1977.

5115 ABSORPTION OF AMINO ACIDS AND PEPTIDE MEALS IN NORMAL HUMAN SUBJECTS. (Eng.) Silk, D. B. A. (St. Bartholomew's Hosp., West Smithfield, London EC1A 7BE, England). *Z. Ernaehrungswiss.* 20(Suppl.):24-31; 1977.

5116 EFFECT OF ENTERIC MICRO-ORGANISMS ON INTESTINAL SUGAR AND FATTY ACID ABSORPTION. (Eng.) Burke, V.; Houghton, M.; Gracey, M. (Princess Margaret Children's Medical Res. Foundation, Perth, Western Australia, Australia). *Aust. J. Exp. Biol. Med. Sci.* 55(Part 4):423-429; 1977.

5117 AGE-DEPENDENT INTESTINAL ABSORPTION. A PHARMACOKINETIC STUDY USING D(+)-XYLOSE [Abstract]. (Eng.) Heimann, G.; Roth, B. (Children's Hosp., Cologne, W. Germany). *Pediatr. Res.* 11(9, Part 2):1013; 1977.

5118 DIPEPTIDE MIGRATION--A GENERAL PRINCIPLE OF THE CELL MEMBRANE [Abstract]. (Eng.)

Nutzenadel, W.; Scriver, C. R. (No affiliation given). *Acta Pediatr. Belg.* 29(2):134; 1976.

5119 LACK OF EFFECT OF 13-NORLEUCINE MOTILIN ON NET CALCIUM UPTAKE OF ISOLATED RABBIT DUODENAL MUSCLE [Abstract]. (Eng.) Ruppin, H.; Mayer, C. J.; Domschke, W.; Wunsch, E.; Demling, L. (Dept. Physiology, Univ. Munich, Munich, Germany). *Gastroenterology* 72(5, Part 2):1123; 1977.

See also, 5128, 5259, 5267, 5319, 5563, 5576, 5806.

MOTILITY

5120 CHARACTERISTIC MOTOR ACTIVITY OF THE GASTROINTESTINAL TRACT IN FASTED CONSCIOUS DOGS MEASURED BY IMPLANTED FORCE TRANSDUCERS. (Eng.) Itoh, Z.; Takeuchi, S.; Aizawa, I.; Takayanagi, R. (Gunma Univ. Sch. Medicine, Maebashi 371, Japan). *Am. J. Dig. Dis.* 23(3):229-238; 1978.

Gastrointestinal contractile activity from the gastric body to the terminal ileum was continuously recorded in conscious dogs for several weeks by means of chronically implanted strain-gauge force transducers. The 24-hr changes in the gastrointestinal contractile activity consisted of two different major patterns, the digestive and interdigestive patterns. In the interdigestive state, a cyclic, recurring, caudad-moving band of strong contractions starting in the stomach and the duodenum and traversing the entire length of the small intestine was observed. When one band of strong contractions reached the distal ileum, another developed in the stomach and the duodenum again and propagated in a caudad direction. Such recycling episodes interrupted by long-lasting quiescence repeatedly occurred until the next meal. These characteristic contractile activities are identical with the interdigestive myoelectric complex of the stomach and the small bowel reported by other authors. The four sequential phases (I-IV) of the migrating myoelectric complex previously defined in terms of action potential activity, seem to correspond to the resting (quiescence) stage, preceding irregular contractions, strong contractions, and subsiding contractions observed in the present study.

5121 A CIRCUMFERENTIALLY-SENSITIVE MINIATURE PRESSURE SENSOR FOR STUDY OF HUMAN ESOPHAGEAL MOTILITY. (Eng.) Kaye, M. D.; Showalter, J. P.; Rock, K. C.; Johnson, E. (Gastroenterology Unit, Univ. Vermont, Burlington, VT). *Med. Res. Eng.* 12(5):10-15; 1977.

A circumferentially sensitive sensor (MT) that consists essentially of a miniature transducer mounted within a sealed fluid-filled chamber, surrounded by a pressure-sensitive silastic diaphragm, for studying human esophageal motility is described. This device is accurate and sensitive. Its use was compared in 10 young healthy men with a standard perfused catheter system (PC) composed of three catheters, whose side openings were at the same axial level, connected to external transducers. Pressures recorded from the lower esophageal sphincter were significantly higher with the MT than with the PC ($p<0.02$-0.001). In the upper esophageal sphincter, the rapid pressure changes associated with deglutition were far more faithfully reproduced with the MT. Contractile pressures recorded after swallowing from the body of the esophagus were similar with the two systems, provided that catheters were perfused at a rapid rate (approximately 8 ml/min for each catheter). This preliminary evaluation indicates that this MT has significant advantages as compared with currently available systems.

5122 INTERDIGESTIVE MOTOR ACTIVITY OF THE LOWER ESOPHAGEAL SPHINCTER IN THE CONSCIOUS DOG. (Eng.) Itoh, Z.; Honda, R.; Aizawa, I.; Takeuchi, S.; Hiwatashi, K.; Couch, E. F. (Gunma Univ. Sch. Medicine, Maebashi 371, Japan). *Am. J. Dig. Dis.* 23(3):239-247; 1978.

Simultaneous measurements of motor activity in the lower esophageal sphincter (LES) and the stomach were recorded continuously for several weeks by means of chronically implanted force transducers in five conscious dogs. The LES contracted precisely in association with the gastric body during the interdigestive state. During this time, a series of simultaneous contractions arose in the LES, gastric body, and antrum; these contractions lasted for 25 ± 2.1 min and then stopped abruptly. This active period was followed by a long period of motor quiescence (78 ± 3.6 min). These cyclic recurring episodes of contractions in the LES and the stomach continued until the next meal. These findings suggest that the interdigestive contractions in the LES act as the orad seal of the stomach during the interdigestive contractions and thus prevent the reflux of the gastric contents into the esophagus during this period.

5123 LOWER OESOPHAGEAL SPHINCTER RESPONSE TO GASTRIN--PHARMACOLOGICAL OR PHYSIOLOGICAL? (Eng.) Henderson, J. M.; Lidgard, G.; Osborne, D. H.; Carter, D. C.; Heading, R. C. (Univ. Edinburgh Medical Sch., Edinburgh, Scotland). *Gut* 19(2):99-102; 1978.

To determine whether gastrin is a physiological determinant of lower esophageal sphincter (LES) pressure, the response of the LES to endogenous gastrin release, produced by the intragastric instillation of protein, was assessed in 10 healthy volunteers. Sphincter pressures were measured by a rapid pull-through technique, and serum gastrin concentrations during each test were determined by radioimmunoassay. Despite stimulation of gastrin release by protein instillation, no significant change in LES pressure was observed. However, i.v. pentagastrin (0.25 and 0.5 μg/kg) administration produced an immediate increase in sphincter pressure, which then returned to the basal level within 4 min. Thus, although pentagastrin is an effective pharmacological stimulant of the sphincter, endogenous gastrin appears not to be a physiological determinant of LES pressure in man.

5124 EFFECTS OF HISTAMINE ON THE LOWER ESOPHAGEAL SPHINCTER IN VIVO: EVIDENCE FOR ACTION AT THREE DIFFERENT SITES. (Eng.) Rattan, S.; Goyal, R. K. (Southwestern Medical Sch., 5323 Harry Hines Blvd., Dallas, TX 75235). *J. Pharmacol. Exp. Ther.* 204(2):334-342; 1978.

The mechanism of the inhibitory effect on the lower esophageal sphincter was investigated in anesthetized opossums. The i.v. or intra-arterial (i.a.) administration of histamine (10 μg/kg) caused a transient rise, followed by a longer-lasting fall in the lower esophageal sphincter pressure (LESP). The i.v. dose of histamine produced an increase of 40.0 ± 13.5 mm Hg, followed by a fall of 72.7 ± 12.6 mm Hg. 2-Methylhistamine also produced a similar biphasic effect on i.v. or i.a. administration; the maximal rise in lower esophageal sphincter pressure was seen with a dose of 5 μg/kg, and a maximal fall occurred with 10 μg/kg. Tetrodotoxin (10 μg/kg) abolished the inhibitory effect and enhanced the excitatory effect of histamine or 2-methylhistamine on the LESP. Pyrilamine (5 mg/kg) abolished the excitatory and inhibitory effects of 2-methylhistamine. Pyrilamine also abolished the excitatory effect and antagonized the inhibitory effect of histamine. 4-Methylhistamine (250 μg/kg) caused a fall in the LESP, which was not influenced by tetrodotoxin. Metiamide (2 mg/kg) antagonized the effect of 4-methylhistamine and the inhibitory effect of histamine, which was resistant to antagonism by pyrilamine. The i.a. administration of a liberator of endogenous histamine, compound 48/80 (8 μg/kg), produced effects similar to those of exogenous histamine. These studies suggest that histamine can act on three different sites to modify the LESP. Stimulation of H_1 receptor on the sphincter muscle causes contraction, and activation of H_1 receptor on intramural inhibitory neurons causes inhibition of the sphincter. Activation of H_2 receptor on the sphincter muscle causes inhibition of the sphincter.

5125 RELATIVE ROLE OF PYLOROPLASTY SIZE, TRUNCAL VAGOTOMY, AND MILK MEAL VOLUME IN CANINE GASTRIC EMPTYING. (Eng.) Hinder, R. A.; Bremner, C. G. (Univ. Witwatersrand, Medical Sch., Hospital St., Hillbrow, Johannesburg, 2001, South Africa). *Am. J. Dig. Dis.* 23(3):210-216; 1978.

The gastric emptying of 10-, 20-, or 40-ml/kg milk meals was measured before and after Heineke-Mikulicz pyloroplasty of 3, 5, or 7 cm (6 dogs) or truncal vagotomy (3 dogs), to compare their relative effects on gastric emptying. The pyloroplasty group underwent vagotomy; following that, the tests were repeated. Initial gastric emptying (in the first 10 min) was increased in comparison with the preoperative period, after 5- and 7-cm pyloroplasties ($p<0.01$) and particularly after vagotomy with all sizes of pyloroplasty ($p=0.001$). Regardless of the volume of meal used, after vagotomy and pyloroplasty there was a 51-63% decrease in intragastric volume within the first 10 min. Increased duodenogastric reflux occurred in those dogs who showed rapid initial gastric emptying. After the first 10 min, all groups were shown to have virtually normal gastric emptying, except the truncal vagotomy group in which gastric emptying was delayed ($p<0.05$). It is the combination of pyloroplasty with vagotomy that is required to produce the very rapid initial gastric emptying of a liquid meal following vagotomy with pyloroplasty. It is concluded that two mechanisms control the gastric emptying of a milk meal. The first acts quickly, is dependent on an intact pylorus, and is influenced by the intragastric volume. The second is a more slowly acting mechanism, requiring up to 10 min to have its effect, and is not dependent on an intact pylorus or the intragastric volume. After vagotomy and pyloroplasty, the speed of gastric emptying in the first 10 min is proportional to the original meal volume, and therefore the therapy of postvagotomy diarrhea and dumping with small frequent meals seems rational.

5126 THE SLOWING OF GASTRIC EMPTYING BY PROTEINS IN TEST ANIMALS. (Eng.) Burn-Murdoch, R. A.; Fisher, M. A.; Hunt, J. N. (Guy's Hosp. Medical Sch., London SE1 9RT, England). *J. Physiol. (Lond.)* 274:477-485; 1978.

Experiments were carried out in nine healthy subjects to determine the effect of proteins in test meals on gastric emptying and to test the proposal that isocaloric concentrations of carbohydrate, fat, and protein in food would equally slow gastric emptying in humans. Test solutions containing either glucose, casein, partially hydrolyzed gelatin, or egg albumin (native or denatured) at concentrations up to 50 g/l in 33 mM trisodium citrate solution were given by gastric tube in volumes of 600 or 750 ml. The volume of the test solution recovered from the stomach after 20 min was measured. The greater the concentration of solute, the greater was the volume of the test solution recovered. All proteins slowed gastric emptying. Gram for gram, gelatin hydrolysate was equivalent to glucose in slowing gastric emptying. Casein was slightly more effective than glucose, and native egg albumin was significantly less effective than glucose ($p<0.01$). The authors conclude that the products of patient hydrolysis stimulated osmoreceptors in the walls

of the duodenum. The results support the suggestion that food proteins contribute to the slowing of gastric emptying in such a way that isocaloric amounts of carbohydrate and mixed protein have the same effect. There was a strong correlation in each subject between the concentration of glucose giving a recovery of 400 ml and the corresponding concentration of casein, but there was no such relationship for gelatin hydrolysate. It is concluded that the between-subject variability in the digestion of casein was small, while that for gelatin hydrolysate was large.

5127 EVALUATION OF A MAGNETIC METHOD FOR THE MEASUREMENT OF SMALL INTESTINAL TRANSIT TIME. (Eng.) Benmair, Y.; Fischel, B.; Frei, E. H.; Gilat, T. (Weizmann Inst. Science, Rehovot, Israel). *Am. J. Gastroenterol.* 68(5):470-475; 1977.

A recently reported method for the measurement of small intestinal transit time was evaluated in 29 subjects, 20 of whom had no disease that could affect motility. An externally applied magnetic transducer senses the presence of an ingested ferromagnetic material (50 g of magnesium ferrite dispersed in a test meal) upon its arrival at the cecal area. The method was compared to the commonly used x-ray method and good correlation between results from the two methods was found in 24 of 28 studies. The mean transit time in the 20 normal subjects was 157.5 ± 63.9 min. In the nine patients with various diseases, the transit times were as follows: diabetes mellitus, 110-170 min; duodenal ulcer, 90 min; gastric ulcer, 195 min; reflux esophagitis, 110 min; ulcerative colitis, 190 min; liver abscess, 148 min; and cholecystectomy, 140 min. This method may be useful in determining intestinal transit times in various diseases. The advantages of the method are that it does not involve any radiation, it is noninvasive, it is inexpensive when compared to x-ray equipment, the instrumentation is simple and mobile, and it may be used in conjunction with x-rays.

5128 SIMULTANEOUS MEASUREMENT OF THE PROPULSION AND MIXING OF SMALL BOWEL CONTENTS IN THE RAT. (Eng.) Gustavsson, S.; Jung, B.; Nilsson, F. (Univ. Hosp., Uppsala, Sweden). *Acta Chir. Scand.* 143(6):359-364; 1977.

A method for the simultaneous measurement of propulsion and mixing of small bowel contents in conscious rats is described. Through a permanent duodenal catheter, ^{125}I- and ^{131}I-labeled polyvinylpyrrolidone (PVP) are infused continuously one after the other. The radioactive label is changed once during the total infusion period of 5 hr. Studies were performed in six groups of animals that differed with respect to time for interchange of test substance. At the end of the total infusion period, the border zone had travelled to six different locations in the small bowel. The animals that dif- killed, and the two radioactivities were recorded from the excised bowel specimen. The resulting activity densities along the small bowel had clear peaks, and the overlap between the two labels in the border zone was minute, indicating that the intestinal contents were transported in isolated portions with only minor exchange of luminal contents between adjacent regions. The transport apparently proceeded steadily in a mainly aboral direction with no indications of abrupt changes in transport velocity.

5129 RICINOLEIC ACID EFFECT ON THE ELECTRICAL ACTIVITY OF THE SMALL INTESTINE IN RABBITS. (Eng.) Mathias, J. R.; Martin, J. L.; Burns, T. W.; Carlson, G. M.; Shields, R. P. (Veterans Admin. Hosp., Gainesville, FL 32602). *J. Clin. Invest.* 61 (3):640-644; 1978.

Since both cholera toxin and ricinoleic acid may share common mechanisms regarding secretion, the hypothesis that they may both have a similar effect on motility was tested. Using myoelectric recording techniques, the myoelectric effects of castor oil, ricinoleic acid (*cis* isomer), and ricinelaidic acid (*trans* isomer) were examined in the small intestine of New Zealand white rabbits. Ricinoleic acid (2 µg/kg/min, 6 mM), was perfused into a distal 12-cm ileal loop. An abnormal myoelectric pattern developed that was similar to the alteration in the electrical activity that has previously been reported for cholera enterotoxin. Castor oil (0.85 ml/kg) had a similar effect. Ricinelaidic acid (2 µg/kg/min) induced no activity. A second preparation consisted of an intraluminal perfusion of ricinoleic acid (2 µg/kg/min) into the first section of the duodenum. The abnormal myoelectric pattern was observed in the jejunum and the ileum but not in the duodenum. The mean onset time for the development of this altered myoelectric state for all experiments was 3.5 hr. These studies suggest that an active motility component in addition to the secretory state exists throughout the small intestine that is exposed to castor oil or ricinoleic acid.

5130 MOTOR EFFECT OF DOPAMINE ON HUMAN SIGMOID COLON: EVIDENCE FOR SPECIFIC RECEPTORS. (Eng.) Lanfranchi, G. A.; Marzio, L.; Cortini, C.; Osset, E. M. (Clinica Medica I, Ospedale S. Orsola, 40100 Bologna, Italy). *Am. J. Dig. Dis.* 23(3):257-263; 1978.

The effect of dopamine on human sigmoid motility was studied in 23 subjects affected by irritable bowel, idiopathic constipation, or chronic ulcerative colitis, and in 3 normal subjects. To record mechanical activity of the sigmoid colon, two small, air-filled balloons mounted on a probe introduced through a sigmoidoscope were used. The recordings were made at a distance of 25 and 15 cm from the anal edge. Dopamine (1, 5, 10, or 20 µg/kg/min) was infused for 10 min after a 30-min control infusion of physiologic solution. The motor response to dopamine was characterized by an increased baseline pressure with plastic waves superimposed. Dopamine produced a significant response at the dose of 5 µg/kg/min ($p<0.05$). Alpha

and beta antagonizing agents failed to oppose the effect of dopamine, while anticholinergic drugs enhanced its motor action. These studies suggest that dopamine may stimulate the motor function of human large bowel through specific receptors.

5131 ADEQUATE MANOMETRIC METHOD FOR THE ESOPHAGUS AND ITS LOWER SPHINCTER. (Ger.) Kunath, U. (Zentrum der Chirurgie, Johann-Wolfgang-Goethe-Universitat, Theodor-Stern-Kai, D-6000 Frankfurt Am Main, W. Germany). *Chirurg* 47(9):477-481; 1976.

5132 NEURONAL ACTIVITY OF THE SUBMUCOSAL PLEXUS OF THE INTESTINE. (Rus.) Nozdrachev, A. D.; Vataev, S. I.; Sanin, G. Iu. (I. P. Pavlov Inst. Physiology, USSR Acad. Medical Sciences, Leningrad, USSR). *Dokl. Akad. Nauk SSSR* 237(4): 984-986; 1977.

5133 THE EFFECT OF ALTERED INTESTINAL TRANSIT TIME ON BILE ACID ENTEROHEPATIC CIRCULATION IN MAN [Abstract]. (Eng.) Hardison, W. G.; Tomaszewski, N.; Grundy, S. M. (Veterans Admin. Hosp., San Diego, CA). *Gastroenterology* 72(5, Part 2):1183; 1977.

5134 EFFECT OF SORMANTOL ON INTESTINAL MOTOR ACTIVITY. (Rus.) Nepokoichitskii, E. O.; Belenkov, A. V. (Clinic Hosp. Surgery, Vitebsk Medical Inst., Vitebsk, USSR). *Khirurgiia* (1):110-112; 1978.

5135 CHANGES IN INTESTINAL PERISTALSIS INDUCED BY THE PERITONEAL FLUID OBTAINED DURING EXPERIMENTAL INTESTINAL OBSTRUCTION. (Rus.) Chakyrov, S. N. (Inst. Hematology Blood Transfusion, Sofia, Bulgaria). *Eksp. Khir. Anesteziol.* (5):41-43; 1976.

5136 CHANGES IN THE POSITION OF THE ASCENDING COLON IN MALE GOTTINGER MINIATURE SWINE IN THE LIGHT OF LEFT LAPAROTOMY. (Ger.) Waibl, H. (Lehrstuhl fur Makroskopische Anatomie der Tiere, Universitat Munchen, Veterinarstrasse 13, D-8000 Munich 22, W. Germany). *Z. Versuchstierkd.* 19(1/2): 85-92; 1977.

5137 ELECTROMOTOR ACTIVITY OF THE STOMACH AND SMALL INTESTINE CAUSED BY STRANGULATION OBSTRUCTION OF THE INTESTINE. (Rus.) Groisman, S. D.; Lukatskii, R. A.; Plotkin, E. L. (Dept. Pharmacology and Experimental Pathology of the Digestive Tract, Kiev Univ., Kiev, USSR). *Patol. Fiziol. Eksp. Ter.* 4:45-50; 1976.

5138 STUDY OF TOTAL GASTRIC EMPTYING WITH BARYTA PEARLS. (Spa.) Laudano, O. M. (Hospital Nacional Centenario, Rosario, Argentina). *Rev. Esp. Enferm. Apar. Dig.* 51(4):405-414; 1977.

5139 ACTION OF CCK UPON GALLBLADDER MOTRICITY [sic] AND BILIARY EVACUATION IN RABBIT. ELECTROMYOGRAPHICAL STUDY [Abstract]. (Eng.) Sarles, J. C.; Rabaud, D. (Centre Hospitalier d'Aubagne, Service de Chirurgie Universitaire, Aubagne, France). *Eur. Surg. Res.* 9(Suppl. 1):174; 1977.

5140 THE CONSTRUCTION OF IMPLANTABLE STRAIN-GAUGE TRANSDUCERS [Abstract]. (Eng.) Rayner, V. (Rowett Res. Inst., Bucksburn, Aberdeen AB2 9SB, Scotland). *J. Physiol. (Lond.)* 273(2): 1P-2P; 1977.

5141 STOMACH MOTILITY IN THE PIG BEFORE AND AFTER VAGOTOMY [Abstract]. (Eng.) Rayner, V. (Rowett Res. Inst., Bucksburn, Aberdeen AB2 9SB, Scotland). *J. Physiol. (Lond.)* 273(2): 73P-74P; 1977.

5142 ACTIVATION OF GASTRO-INTESTINAL SMOOTH MUSCLE INDUCED BY THE CALCIUM IONOPHORE A23187. (Eng.) Mandrek, K.; Golenhofen, K. (Physiologisches Institut der Universitat Marburg, Deutschhausstrasse 2, D-3550 Marburg/Lahn, W. Germany). *Pfluegers Arch.* 371(1/2):119-124; 1977.

5143 EFFECTS OF MEAL SIZE ON POSTPRANDIAL LOWER ESOPHAGEAL SPHINCTER PRESSURE (LESP). (Eng.) Maher, J. W.; Crandall, V.; Woodward, E. R. (Univ. Florida Coll. Medicine, Gainesville, FL). *Surg. Forum* 28:342-344; 1977.

5144 GASTRO-INTESTINAL TRANSIT TIME AND SERUM LIPID LEVELS IN BLACK SCHOOLCHILDREN. (Eng.) Walker, A. R. P.; Gajjar, D. (South African Inst. Medical Res., Johannesburg, South Africa). *S. Afr. Med. J.* 52(17):677-679; 1977.

5145 GASTRIC EMPTYING RATE CONSTANTS AFTER ORAL ADMINISTRATION OF DRUG SOLUTION TO MICE, RATS, AND RABBITS. (Eng.) Watanabe, J.; Okabe, H.; Ichihashi, T.; Mizojiri, K.; Yamada, H.; Yamamoto, R. (Faculty Pharmaceutical Sciences, Nagoya City Univ., Tanabe-dori, Mizuho-ku, Nagoya 467, Japan). *Chem. Pharm. Bull.* 25(9): 2147-2155; 1977.

5146 THE EFFECT OF VISCOUS SUBSTANCES ON THE TRANSIT TIME OF BARLEY DIGESTA IN RATS. (Eng.) Gohl, B.; Gohl, I. (Agricultural Coll. Sweden, S-750 07 Uppsala, Sweden). *J. Sci. Food Agric.* 28(10):911-915; 1977.

See also, 5077, 5179, 5328, 5395, 5412, 5468, 5469, 5478, 5590, 5800.

5147 EFFECT OF METOCLOPRAMIDE ON PROLACTIN SECRETION IN MAN. (Ita.) Minuto, F.; Marugo, M.; Giusti, M.; Baiardi, M. (Istituto Scientifico di Medicina Interna, dell'Universita di Genova, Genoa, Italy). *Boll. Soc. Ital. Biol. Sper.* 52(21):1802-1807; 1976.

5148 PREMATURE INCREASES IN AMYLASE OF POSTNATAL RAT PAROTID WITH CHRONIC ISOPROTERENOL. (Eng.) Schneyer, C. A. (Dept. Physiology, Univ. Alabama, Birmingham, AL 35294). *Proc. Soc. Exp. Biol. Med.* 155(3):440-444; 1977.

5149 CYCLIC NUCLEOTIDE ACTIVITY IN GASTROINTESTINAL TISSUES AND FLUIDS. (Eng.) Schwartzel, E. H. Jr.; Bachman, S.; Levine, R. A. (Upstate Medical Center, 750 E. Adams St., Syracuse, NY 13210). *Anal. Biochem.* 78(2):395-405; 1977.

5150 ENZYME ADAPTATION TO PROTEIN DEFICIENCY AND CHANGES IN FOOD LIPIDS COMPONENTS. (Eng.) Pokrovsky, A. (Inst. Nutrition, Medical Acad. Science, Ustinskij pier 2/14, Moscow, USSR). *Bibl. Nutr. Dieta* (23):34-50; 1976.

5151 DEPENDENCE OF THE CIRCADIAN RHYTHM OF BODY AND LIVER PROTEIN, LIPID AND GLYCOGEN ON THE HOURS OF PROTEIN INTAKE. (Eng.) Markova, M.; Angelova, K. (Hygiene Center, 15 Dimitar Nestorov Str., Sofia, Bulgaria). *Bibl. Nutr. Dieta* (23):163-168; 1976.

See also, 5068, 5078, 5236.

5152 EFFECT OF ATROPINE ON MEAL-STIMULATED GASTRIN AND GASTRIC INHIBITORY POLYPEPTIDE (GIP) RELEASE. (Eng.) Baumert, J. E., Jr.; Cataland, S.; Tetirick, C. E., Jr.; Pace, W. G.; Mazzaferri, E. L. (Ohio State Univ. Hosp., 410 W. 10th Ave., Columbus, OH 43210). *J. Clin. Endocrinol. Metab.* 46(3):473-476; 1978.

The effect of atropine (80 μg/kg, s.c.) on meal-stimulated gastric inhibitory polypeptide (GIP) and gastrin release was studied in five foxhounds and compared with control studies done in the same animals given a meal without atropine. Without atropine, peak incremental serum gastrin occurred between 5 and 15 min after the meal, whereas the greatest increment in serum GIP occurred 60 min postcibal. Atropine had no effect on basal concentrations of gastrin or GIP. However, when atropine was given before feeding, serum gastrin concentrations from 75 to 120 min postcibal were significantly higher ($p<0.04$) than after the meal alone. The normal meal-stimulated rise in serum GIP was almost completely inhibited by atropine. It is concluded that (a) the rise in serum gastrin after a meal preceeds the rise in serum GIP; (b) atropine potentiates the late gastrin response while suppressing the increase in serum GIP after a meal; and (c) the mechanism by which atropine potentiates gastrin release may be related to its suppressive effects on intestinal inhibitors of gastrin secretion, such as GIP.

5153 SERUM GASTRIN CONCENTRATIONS FOLLOWING ORAL BETHANECHOL WITH AND WITHOUT A MEAL. (Eng.) Humphries, T. J.; Higgs, R. H.; Castell, D. O.; McGuigan, J. E. (Naval Regional Medical Center, Philadelphia, PA 19145). *Am. J. Dig. Dis.* 23(3):225-228; 1978.

The effect of p.o. bethanechol (B) on endogenous gastrin release, both basally and in association with the physiologic stimulus of a protein meal, was studied in 10 men without gastrointestinal disease. Serum gastrin levels were obtained from these subjects following (1) a p.o. placebo, (2) a p.o. dose of 25 mg of B, (3) a 100-g protein meal plus placebo, and (4) a 100-g protein meal plus 25 mg of B. Following B or placebo, there were no significant changes in basal serum gastrin levels of 98.7 ± 29.3 pg/ml and 82.4 ± 12.3 pg/ml, resp. Significant increases ($p<0.05$) of serum gastrin occurred after the protein meal and after the protein meal combined with B. The gastrin levels thus obtained were significantly greater than basal values but not different from each other. It is proposed that lower esophageal sphincter pressure increases after B administration are not

due to the release of endogenous gastrin, as shown by the absence of increases in basal serum gastrin levels and failure to augment the gastrin release of a physiologic stimulus.

5154 EFFECT OF CATECHOLAMINES ON GASTRIN RELEASE. (Eng.) Hayes, J. R.; Ardill, J.; Shanks, R. G.; Buchanan, K. D. (Dept. Medicine, Queen's Univ., Belfast, Northern Ireland). *Metabolism* 27(4):385-391; 1978.

In vivo and *in vitro* techniques were used to study the effect of catecholamines on gastrin release. The i.v. infusion of epinephrine (1 µg/kg/min for 2 20-min periods) in dogs produced a significant rise in the plasma gastrin concentration (from 48 ± 9 pg/ml to 97 ± 38 pg/ml, $p<0.001$, for the first infusion; from 48 ± 15 pg/ml to 90 ± 35 pg/ml, $p<0.01$ for the second infusion). This response was prevented by the administration of propranolol (0.1 mg/kg, i.v. 25 min before epinephrine; 1.4 µg/kg/min during epinephrine infusion). The infusion of isoproterenol (0.02 µg/kg/min, 15 min) produced a significant rise in gastrin level, while phenylephrine (0.6, 2.5, or 10 µg/kg/min) had no effect. In *in vitro* studies using isolated pieces of rat antrum, isoproterenol stimulated acute phase release of gastrin, whereas phenylephrine was again without effect. The studies indicate that catecholamines directly influence gastrin cell function.

5155 A SPECIFIC GASTRIN RECEPTOR SITE IN THE RAT STOMACH. (Eng.) Brown, J.; Gallagher, N. D. (Royal Prince Alfred Hosp., Sydney, New South Wales 2050, Australia). *Biochim. Biophys. Acta* 538(1):42-49; 1978.

A specific receptor for gastrin I was demonstrated in the rat stomach fundus. In addition, the action of other hormones on gastrin receptor binding was studied. Specific binding of ^{125}I-labeled gastrin I was localized to particles sedimenting between 250-20,000 x *g*. Saturation of binding sites occurred with a gastrin concentration of 10^{-11} M in an assay system containing 0.6-1.7 mg/ml of homogenate protein. Gastrin binding was reversible, temperature- and pH-dependent, and susceptible to tryptic digestion. Electron microscopic and enzymatic studies showed the binding fraction to contain predominantly mitochondria. Preincubation of the homogenate with 10^{-8} M cholecystokinin or secretin inhibited gastrin binding to a greater extent (60%) than did an equimolar concentration of pentagastrin (0%); 10^{-7} M pentagastrin, however, inhibited gastrin binding 86%. Cimetidine (10^{-8} M) did not affect the binding of gastrin to the receptor, suggesting that the gastrin and histamine receptors do not share the same locus.

5156 QUANTITATION OF ANTRAL GASTRIN CELL POPULATIONS IN THE DOG. (Eng.) Delaney, J. P.; Michel, H. M.; Michael, M.; Eisenberg, M.; Bonsack, M. (Univ. Hosp., Box 89, 420 Delaware St., S.E., Minneapolis, MN 55455). *Gastroenterology* 74(4):708-712; 1978.

With a view to developing a technique for quantitating gastrin (G) cells that would allow sequential sampling of the antral mucosa before and after experimental manipulations, a method for identifying G cells was first validated; the distribution and variability of G cell numbers within single dog antrums and differences among animals were then studied. A method for enumerating G cells in dog antral mucosa by a fluorescent antibody technique was shown to be valid with respect to specificity and reproducibility. The state of intracellular gastrin storage did not influence G cell identification by this technique. To obtain values representative of the entire antrum, it was found that all G cells in long strips of antral mucosa had to be counted. Results were best expressed as G cells/cm length of mucosa. Even with large mucosal samples, there were considerable variations in G cell density within a single antrum. The "average" dog antrum contained about 35 million G cells. There was as much as a two-fold range in G cell density from one dog to another. Each animal should, therefore, serve as its own control when influences on G cell populations are to be studied experimentally.

5157 IN VIVO RELEASE OF GASTRIN INTO HUMAN GASTRIC JUICE. (Eng.) Knight, N. F.; Fiddian-Green, R. G.; Vinik, A. I. (Groote Schuur Hosp., Cape Town, South Africa). *Br. J. Surg.* 65 (2):118-120; 1978.

The release of antral gastrin was examined in seven healthy human subjects by infusing saline and albumin into their stomachs. Immunoreactive gastrin (IRG) was present in fasting serum but not in fasting gastric juice. Intragastric infusions of saline and albumin induced small but significant ($p<0.05$) rises in the serum concentrations of IRG. There was no significant difference between the magnitude of the serum gastrin responses to these two stimuli. The stimuli induced an increase in the luminal concentration of IRG that was sixfold greater than that in the serum concentration of IRG. The response to albumin was significantly greater than the response to saline ($p<0.05$). The IRG in gastric juice was chromatographically similar to heptadecapeptide (G17) gastrin. The stimuli also released IRG in five patients with duodenal ulcers. The magnitude of the release into serum and gastric juice in these patients was significantly reduced by antrectomy ($p<0.05$). This result, together with those obtained with molecular sieve and anion exchange chromatography, suggest that the IRG in gastric juice may be G17.

5158 INTERRELATIONSHIPS BETWEEN THE GASTRIC SECRETORY RESPONSES, PROSTAGLANDIN E_2 INHIBITION AND SERUM LEVEL OF IMMUNOREACTIVE GASTRIN IN PYLORUS-LIGATED AND ANTRECTOMIZED RATS. (Eng.) Nagy, L.; Mozsik, G.; Tarnok, F.; Szalai, M.; Poth, I.; Javor, T. (Univ. Medical Sch., H-7643 Pecs, Hungary). *Pharmacology* 16(3):135-141; 1978.

The effects of prostaglandin E_2 (PGE_2) on gastric secretion and the serum level of immunoreactive gastrin were studied in pylorus-ligated and antrectomized rats. The administration of PGE_2 (75, 150, or 300 µg/kg, s.c.) caused a significant decrease in both volume of gastric secretion and acid output in both pylorus-occluded ($p<0.01$) and antrectomized rats ($p<0.001$). No significant changes were found in the serum gastrin levels of both pylorus-ligated and antrectomized rats. No significant changes in serum levels of immunoreactive gastrin were produced by different doses of PGE_2, in comparison with their marked inhibitory effects on gastric H^+ secretion. It is concluded that immunoreactive gastrin plays no essential role in the development of gastric hypersecretion or in PGE_2-produced inhibition on gastric secretion in pylorus-occluded rats.

5159 EFFECT OF METHYLATED PROSTAGLANDIN E_2 ANALOGUE ON CANINE AND HUMAN GASTRIC MUCOSAL BARRIER. (Eng.) Konturek, S. J.; Tasler, J.; Obtulowicz, W.; Kwiecien, N.; Sito, E.; Oleksy, J. (Inst. Physiology, 31-531 Krakow, Grzegorzecka 16, Poland). *Gastroenterol. Clin. Biol.* 2(2):177-184; 1978.

The effects of synthetic 15 (S)-15-methyl-prostaglandin E_2 methyl ester (PG-S) on the ionic permeability of the gastric mucosa under resting conditions and following bile salt-induced disruption of the mucosal barrier were studied in Heidenhain pouch dogs and in six healthy men. The PG-S instilled into the pouch in a high concentration (40 µg/kg/hr) or given i.v. in a large dose (5 µg/kg/hr) did not alter the mucosal barrier, sodium taurocholate. PG-S introduced into the healthy human stomach in a therapeutic dose (1.5 µg/kg) caused a marked increase in Na^+ output ($p<0.05$) without significant change in H^+ back-diffusion and did not change the response of the mucosa to sodium taurocholate. These studies indicate that PG-S given locally or i.v. does not affect the gastric mucosal barrier in the dog and probably also does not affect the mucosal barrier in the human stomach, although the increased output of Na^+ is difficult to explain.

5160 VAGAL STIMULATION AND ITS ROLE IN ELICITING GASTRIN BUT NOT GLUCAGON RELEASE FROM THE ISOLATED PERFUSED DOG STOMACH. (Eng.) Lefebvre, P. J.; Luyckx, A. S.; Brassinne, A. H. (Hopital de Baviere, Blv. de la Constitution, 66 B-4020 Liege, Belgium). *Gut* 19(3):185-188; 1978.

The effect of an electrical stimulation of the vagus nerves on glucagon release from the isolated perfused dog stomach was investigated. Electrical stimulation (10 V, 10 Hz, 3 min) of both dorsal and ventral vagal trunks of the stomach perfused with whole blood induced strong gastric contractions, transient release of cyclic guanosine monophosphate, and marked gastrin release ($p<0.02$ at 30-60 sec, $p<0.01$ at 90-240 sec). No gastric glucagon release was elicited either at "normal" (4.8 ± 0.1 mM) or at low (1.5 ± 0.1 mM) concentrations of blood glucose. It is concluded that, in conditions effective for the stimulation of gastrin release, electrical stimulation of the vagus nerves does not stimulate glucagon release from the isolated perfused dog stomach. Thus, one of the well accepted mechanisms controlling pancreatic-glucagon secretion, vagal stimulation, is ineffective on gastric glucagon release.

5161 THE ISOLATION AND PROPERTIES OF A NON-PEPSIN PROTEINASE FROM HUMAN GASTRIC MUCOSA. (Eng.) Roberts, N. B.; Taylor, W. H. (Liverpool Area Health Authority [Teaching], Central Southern District, Ashton St., Liverpool L3 5RT, England). *Biochem. J.* 169(3):617-624; 1978.

A nonpepsin proteinase, proteinase 2, was successfully isolated free from pepsinogen from the gastric mucosa of a patient with a duodenal ulcer and the uninvaded mucosa of a patient with a gastric adenocarcinoma by repetitive chromatography on diethylaminoethane- and carboxymethyl-celluloses, and its properties were compared with those of other human gastric proteinases. Proteinases 1a and 1b, found in gastric adenocarcinoma, were not found in the gastric mucosa of these patients. Proteinase 2 was shown to have an asymmetrical broad pH-activity curve with a maximum over the pH range 3.0-3.7. Proteolytic activity of proteinase 2 was inhibited by pepstatin; the concentration of pepstatin giving 50% inhibition was 3 nM. Inhibition of proteolytic activity by carbenoxolone and related triterpenoids indicated that, at pH 4.0, proteinase 2 possesses structural characteristics relating it to the pepsins and, at pH 7.4, to the pepsinogens. The sites of cleavage of the B-chain of oxidized insulin for proteinase 2 at pH 1.7 and pH 3.5 were shown to be similar to those previously established for human pepsin 3 and for the cathepsin E of rabbit bone marrow. The nonpepsin proteinase 2 (cathepsin) of human gastric mucosa has properties more similar to cathepsin E than to cathepsin D.

5162 ACTIVATION OF HUMAN ADENYLATE CYCLASE IN THE UPPER GASTROINTESTINAL TRACT BY VASOACTIVE INTESTINAL POLYPEPTIDE. (Eng.) Simon, B.; Kather, H. (Medizinische Universitatsklinik Heidelberg, 6900 Heidelberg, W. Germany). *Gastroenterology* 74(4):722-725; 1978.

To explore the mechanism involved, the effects of various polypeptide hormones, known to inhibit gastric acid secretion, on the adenylate cyclase system were tested in human gastric and duodenal mucosal homogenates. Glucagon (1 mg/ml) and secretin (20 µg/ml) failed to stimulate the enzyme system in the stomach. The latter hormone produced a small but significant activation of the duodenal cyclase ($p\leq0.05$). The vasoactive intestinal polypeptide (VIP), however, induced a dose-dependent increase of enzyme activity throughout the stomach and the duodenum. Maximal effects (1.8- to 3.0-fold increase) were observed at a VIP-concentration of about 10 µg/ml. Because the entire physiological

role of VIP in gastric function has not been defined, it cannot be discerned whether the VIP-stimulated adenylate cyclase is linked to inhibition of gastric acid secretion or to another effect of this hormone in human gastric function.

5163 EFFECT OF DOPAMINE IN STRESS ULCER OF RATS. (Eng.) Lauterbach, H. H.; Mattes, P. (Dept. General Surgery, Univ. Ulm, Steinhovelstrasse 9, D-7900 Ulm, W. Germany). *Eur. Surg. Res.* 9(4):258-263; 1977.

5164 GASTRIC ADENOSINE TRIPHOSPHATASES: A REVIEW OF THEIR POSSIBLE ROLE IN HCl SECRETION. (Eng.) Forte, J. G.; Lee, H. C. (Dept. Physiology-Anatomy, Univ. California, Berkeley, CA 94720). *Gastroenterology* 73(4, Part 2):921-926; 1977.

5165 METABOLIC CHANGES ASSOCIATED WITH GASTRIC STIMULATION. (Eng.) Hersey, S. J. (Dept. Physiology, Emory Univ., Atlanta, GA 30322). *Gastroenterology* 73(4, Part 2):914-919; 1977.

5166 WEAK ACID ACCUMULATION IN THE SEROSAL EXTRACELLULAR COMPARTMENT OF THE FROG GASTRIC MUCOSA. (Eng.) Villegas, L. (Centro de Biofisica y Bioquimica, Instituto de Investigaciones Cientificas [IVIC], Apartado 1827, Caracas 101, Venezuela). *Biochim. Biophys. Acta* 469(3): 237-245; 1977.

5167 INTERRELATIONSHIPS BETWEEN HISTAMINE, PROSTAGLANDINS, AND CYCLIC AMP IN GASTRIC SECRETION: A HYPOTHESIS. (Eng.) Dousa, T. P.; Dozois, R. R. (Mayo Clinic, Rochester, MN 55901). *Gastroenterology* 73(4, Part 2):904-912; 1977.

5168 THE EFFECTS OF ZINC SULPHATE ON GASTRIC HISTAMINE RELEASE AND ULCER FORMATION IN STRESSED PYLORUS-OCCLUDED RATS. (Eng.) Ogle, C. W.; Cho, C. H. (Faculty Medicine, Univ. Hong Kong, Hong Kong). *Pharmacol. Res. Commun.* 9(8): 679-688; 1977.

5169 INHIBITORY EFFECT OF FENTONIUM ON GASTRIC ACID SECRETION IN DIFFERENT LABORATORY ANIMALS. (Eng.) Impicciatore, M.; Morini, G.; Cavaggioni, A. L.; Bertaccini, G. (Inst. Pharmacology, Univ. Parma, Parma, Italy). *Farmaco [Sci.]* 32(7):482-489; 1977.

5170 GASTRIN RELEASE IN RESPONSE TO ARGININE INFUSION. (Eng.) Dent, J.; Adeney, P.; Hansky, J. (Medical Coll. Wisconsin, 8700 W. Wisconsin Ave., Milwaukee, WI 53226). *Digestion* 16(1/2):23-27; 1977.

5171 THE EFFECT OF HEXAMETHONIUM ON GASTRIC ACID SECRETION IN THE CONSCIOUS RAT. (Eng.) Bunce, K. T.; Parsons, M. E. (Smith Kline & French Lab., Ltd., Welwyn Garden City, Hertfordshire, England). *Agents Actions* 7(5/6):507-511; 1977.

5172 THE COMPARATIVE GASTRIC ULCEROGENIC ACTIVITES ON NON-STEROID ANTI-INFLAMMATORY DRUGS. (Eng.) Rainsford, K. D. (Univ. Tasmania Medical Sch., G.P.O. Box 252C, Hobart, Tasmania 7001, Australia). *Agents Actions* 7(5/6):573-577; 1977.

5173 INFLUENCE OF ASPIRIN ON HEALING OF CHRONIC GASTRIC ULCERS IN DOGS. (Eng.) Takeuchi, K.; Okabe, S.; Takagi, K.; Umeda, N. (Faculty Pharmaceutical Science, Univ. Tokyo, 7-3-1 Hongo, Bunkyo, Tokyo 113, Japan). *Digestion* 16(1/2):51-56; 1977.

5174 COMPARISON OF THE STEP-DOSE AND SINGLE-DOSE ACID RESPONSE TO HISTAMINE AND PENTAGASTRIN IN CHRONIC GASTRIC FISTULA RATS. (Eng.) Pascaud, X. B.; Roger, A. R.; Genton, M. J. H. (INRS, 14 rue du Val d'Or, F-92150 Suresnes, France). *Digestion* 16(1/2):57-68; 1977.

5175 A STUDY OF ACIDIC GLYCOSAMINOGLYCANS IN HUMAN GASTRIC TISSUE. (Eng.) Sekino, T.; Murata, K.; Saito, Y.; Tsubura, K. (Univ. Tokyo Sch. Medicine, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113, Japan). *Digestion* 16(1/2):28-39; 1977.

5176 GASTRIC SECRETION WITH FEEDING AND RESTRAINT IN CONSCIOUS RHESUS MONKEYS. (Eng.) Bauer, R. F.; Ambromovage, A. M. (Sch. Medicine, Univ. Pennsylvania, Philadelphia, PA 19104). *J. Med. Primatol.* 6(4):245-250; 1977.

5177 BLOOD GROUP ABH AND PRECURSOR ACTIVITIES OF HUMAN GASTRIC MUCUS AND MUCOSAL EXTRACTS [Abstract]. (Eng.) Feizi, T.; Picard, J. (MRC Clinical Res. Center, Harrow, Middlesex, England). *Adv. Exp. Med. Biol.* 89:5[illegible], 1977.

5178 CHANGES OF MUCOSUBSTANCES IN THE GASTRIC JUICES DURING AND FOLLOWING RESTRAINT-COLD STRESS IN RATS [Abstract]. (Eng.) Hayashi, T.; Ito, H.; Glass, G. B. J. (Tokyo Medical Coll. Hosp., Tokyo, Japan). *Adv. Exp. Med. Biol.* 89:510-511; 1977.

5179 SIMULTANEOUS MEASUREMENT OF GASTRIC SECRETION AND MOTILITY IN RESPONSE TO VARIOUS STIMULI IN THE FERRET [Abstract]. (Eng.) Andrews, P. L. R.; Bower, A. J. (Dept. Physiology, Univ. Sheffield, Sheffield 10, England). *J. Physiol. (Lond.)* 275:53P; 1978.

5180 ACID SECRETION WITHOUT CHANGES IN MUCOSAL CYCLIC NUCLEOTIDES IN THE GUINEA-PIG STOMACH [Abstract]. (Eng.) Canfield, S. P.; Curwain, B. P.; Phillips, J.; Price, C. (St. Mary's Hosp. Medical Sch., London W2 1PG, England). *J. Physiol. (Lond.)* 275:52P-53P; 1978.

5181 INHIBITION OF GASTRIC HCO_3^- SECRETION BY NORADRENALINE AND ADRENALINE [Abstract]. (Eng.) Flemstrom, G. (Dept. Physiology and Medical Biophysics, Univ. Uppsala, Uppsala, Sweden). *Acta Physiol. Scand.* 102(1):17A-19A; 1978.

5182 PIRENZEPINE--A NEW ANTISECRETORY DRUG [Abstract]. (Eng.) Stockbrugger, R.; Jaup, B.; Dotevall, G. (Sahlgrenska Sjukhuset, Goteborg, Sweden). *Scand. J. Gastroenterol.* 12 (Suppl. 45):103; 1977.

5183 A NON-CHOLINERGIC COMPONENT OF THE DISTENSION POTENTIATION OF GASTRIC ACID SECRETION [Abstract]. (Eng.) Davison, J. S.; Schofield, B. (Dept. Physiology, Univ. Dundee, Dundee DD1 4HN, Scotland). *J. Physiol. (Lond.)* 273(2):59P-60P; 1977.

See also, 5068, 5069, 5070, 5071, 5076, 5081, 5125, 5308, 5401, 5412, 5417, 5420, 5423, 5426, 5440, 5443, 5449, 5461, 5462, 5475, 5476, 5487, 5493, 5496, 5816.

SECRETION AND METABOLISM

Pancreas

5184 EXOCRINE PANCREAS UNDER EXPERIMENTAL CONDITIONS. IV. ALTERATIONS OF INTERCELLULAR JUNCTIONS BETWEEN ACINAR CELLS FOLLOWING PANCREATIC DUCT LIGATION. (Eng.) Metz, J.; Merlo, M.; Billich, H.; Forssmann, W. G. (Anatomisches Institut der Universitat, Im Neuenheimer Feld 307, D-6900 Heidelberg, W. Germany). *Cell Tissue Res.* 186(2):227-240; 1978.

To study early ultrastructural alterations of the permeability barrier between the luminal and interstitial compartments of the exocrine pancreas, pancreatic tissue from male Wistar rats was investigated during various intervals after pancreatic duct ligation. Concomitant to the increase of the intraluminal pressure, alterations were found in the arrangement of the luminal membrane surface and the zonulae occludentes of the acinar cells. The strands of the zonulae occludentes exhibited a disarrangement. The number of strands diminished and small interruptions as well as large discontinuities of the strands were observed in most regions of the acinar cells. Furthermore, gap junctions were found very infrequently between acinar cells. The ultrastructural alterations of the zonulae occludentes suggest a gradual adaptation to the increasing unilateral pressure. However, a leakage of the paracellular permeability barrier occurred, which contributed to the known shunt between the compartments of the pancreatic juice and the interstitial space following pancreatic duct obstruction.

5185 PANCREATIC ACINAR CELLS: ACETYLCHOLINE-EVOKED ELECTRICAL UNCOUPLING AND ITS IONIC DEPENDENCY. (Eng.) Iwatsuki, N.; Petersen, O. H. (Dept. Physiology, Univ. Dundee, Dundee DD1 4HN, Scotland). *J. Physiol. (Lond.)* 274:81-96; 1978.

Acetylcholine (ACh)-evoked electrical uncoupling and its ionic dependency were investigated in pancreatic acinar cells from mice and rats, and the source of the calcium needed in the uncoupling process was studied. Isolated segments of mouse or rat pancreas were placed in a Perspex bath through which physiological saline solutions were circulated. Intracellular recordings from surface acini were made by inserting up to three separate microelectrodes into neighboring cells within the same acinus. Through one of these electrodes current pulses were injected. Electrical coupling between the cells was continuously assessed. The acinus under investigation was stimulated by iontophoresis of ACh from an extracellular micropipette. During resting conditions, all cells within an acinus were fully electrically coupled. A 5- to 10-sec pulse of a relatively large iontophoretic ACh-ejecting current, causing initially the well characterized surface cell membrane depolarization and resistance reduction, was followed by a marked electrical uncoupling of neighboring cells. In some cases, one cell was clearly being isolated equally from the two other cells impaled; in other cases, the cell into which current pulses were injected was becoming more isolated from one of the neighboring cells than from the other one. The ACh-evoked electrical uncoupling was completely reversible and could be repeatedly observed in the same cell. The electrical uncoupling in response to short pulses of ACh (5-10 sec) was not affected by even prolonged (≤50 min) exposure to Ca-free solution containing ethylene glycol-bis-(ß-aminoethylether)-*N*,*N*^{1}-tetraacetic acid. ACh-evoked uncoupling (short pulses) was not reduced about 5 min after introduction of 2 mM Mn or of 5 mM Ni or Co. Mn thereafter gradually reduced and finally (after about 30 min) abolished the ACh-evoked uncoupling. Ni and Co gradually enhanced the uncoupling response. The blocking

effect of Mn on the ACh-evoked uncoupling occurred much faster in the absence of superfusion fluid Ca. During a period of sustained ACh stimulation, sustained electrical uncoupling was observed. If 5 mM Ni or Co was introduced during such a stimulatory period, the cells recoupled. This effect of Ni and Co was immediate and fully reversible. The uncoupling responses to short pulses of ACh was not reduced immediately after replacing superfusion fluid Na by Tris at a time when the surface cell membrane depolarization and resistance reduction was already severely reduced. Thereafter, a gradual slow reduction of the ACh-evoked uncoupling was observed. This uncoupling did not occur if Na was replaced by Li. It is concluded that the Ca needed to raise $[Ca^{2+}]_i$ sufficiently to cause electrical uncoupling comes from the cells in cases of uncoupling evoked by short pulses of ACh, but from the external solution in cases of sustained uncoupling evoked by sustained stimulation of ACh.

5186 β-ADRENOCEPTOR STIMULATION OF EXOCRINE SECRETION FROM THE RAT PANCREAS. (Eng.) Furuta, Y.; Hashimoto, K.; Washizaki, M. (Res. Lab., Nippon Kayaku Co., Shimo, Kita-ku, Tokyo 115, Japan). *Br. J. Pharmacol.* 62(1):25-29; 1978.

The effects of i.v. catecholamines on exocrine pancreas secretion were investigated in anesthetized rats. The flow rate of pancreatic juice under resting conditions was 11.1 ± 3.2 µl/hr in 100 animals. Dopamine (0.3-3 mg/kg) and isoproterenol (1-10 µg/kg) induced almost the same increase in pancreatic secretion, showing that dopamine is 300 times less potent than isoproterenol. The relative potency of the two amines for stimulation of pancreatic secretion was equivalent to that for β-stimulation of the contractile force of the left ventricle *in vivo*. Propranolol (0.5 mg/kg) completely antagonized the dopamine- and isoproterenol-induced stimulation of pancreatic secretion. Haloperidol (10 mg/kg) failed to suppress the secretory effect of dopamine on the exocrine pancreas but abolished the dopamine-induced hypotension. The dopamine-induced secretion was not modified by atropine (3 mg/kg), phenoxybenzamine (3 mg/kg), vagotomy, or pithing. Epinephrine and norepinephrine (10 µg/kg) induced secretion after phenoxybenzamine treatment (3 mg/kg). It is suggested that the rat pancreas has a stimulatory β-adrenoceptor mechanism of exocrine secretion.

5187 EXOCRINE PANCREATIC SECRETION AND IMMUNOREACTIVE SECRETIN (IRS) RELEASE AFTER INTRADUODENAL INSTILLATION OF BILE IN MAN. (Eng.) Osnes, M.; Hanssen, L. E.; Flaten, O.; Myren, J. (Ulleval Hosp., Oslo 1, Norway). *Gut* 19(3):180-184; 1978.

Because the effect of bile on endogenously stimulated pancreatic enzyme secretion and on exogenously stimulated bicarbonate secretion is uncertain, the effect of intraduodenal instillation of bile on basal pancreatic secretion was studied in six subjects with a normal endoscopic pancreatogram. In addition, the effect of bile on immunoreactive secretin (IRS) release was studied. The subjects were investigated after an overnight fast by means of a side-viewing duodenoscope. After cannulation of the main pancreatic duct, juice was collected in 5-min samples for 20 min. An iso-osmolar solution of 6 g cattle bile was then infused into the duodenum through a separate catheter attached to the outside of the duodenoscope, and pancreatic juice collected in 5-min samples for another 20 min. Blood was frequently drawn from an arm vein through an indwelling catheter for estimation of IRS by radioimmunoassay. The flow rate of pancreatic juice and outputs of bicarbonate, amylase, and protein increased significantly after bile infusion ($p<0.02$ for pancreatic juice, $p<0.05$ or $p<0.02$ for bicarbonate, $p<0.02$ for amylase, and $p<0.02$ or $p<0.05$ for protein). A significant rise in plasma IRS was also found 5 min after instillation of bile ($p<0.02$). This study confirms the previous hypothesis that secretin is released from the upper intestine. The release of secretin is probably not the sole explanation of the observed increase in pancreatic enzyme secretion.

5188 THE EFFECT OF THE IONOPHORE A23187 ON AMYLASE RELEASE, CELLULAR INTEGRITY AND ULTRASTRUCTURE OF MOUSE PANCREATIC ACINI. (Eng.) Williams, J. A. (Dept. Physiology, Univ. California, San Francisco, CA 94143). *Cell Tissue Res.* 186(2): 287-295; 1978.

The effects of the Ca^{2+} ionophore A2317 on pancreatic amylase and LDH release, cellular electrolyte balance, and cell ultrastructure were studied in incubated pancreatic fragments from Swiss mice. A23187 (0.3 µM) in the presence of Ca^{2+} increased amylase release, but at higher concentrations (1-10 µM) it also increased LDH release and increased the uptake of ^{14}C-sucrose with concomitant loss of tissue K^+ and gain in Na^+. The ultrastructure of the majority of acini appeared normal but showed depletion of zymogen granules. Microtubules and microfilaments, which have been implicated in the release process, were normal or increased in number. In the absence of Ca^{2+}, the ionophore had no effect on secretion, cellular integrity, or ultrastructure. It is concluded that A23187 in the presence of Ca^{2+} increases amylase release by a mechanism comparable to the terminal steps in stimulus-secretion coupling induced by physiological secretagogues. This finding provides further evidence that amylase release is mediated by an increase in cell Ca^{2+}, although the mechanisms of the ionophore- and physiological secretagogue-induced rise in Ca^+ are probably different. High concentrations of ionophore (>1 µM) also induce Ca^{2+}-dependent damage in a fraction of the cells.

5189 COMPARATIVE ASSESSMENT OF THE SECRETIN-CERULEIN AND SECRETIN-PANCREOZYMIN TESTS IN THE STUDY OF THE EXOCRINE FUNCTION OF THE PANCREAS. (Rus.) Grebenev, A. L.; Irmatov, M. N.; Pletneva, N. G.; Vainshtein, T. Ia.; Starodvortseva, V. G. (Dept. Introduction into Internal Diseases,

I. M. Sechenov 1st Moscow Medical Inst., Moscow, USSR). *Lab. Delo* (7):400-403; 1977.

5190 GASTRIC SECRETAGOGUE PANCREATIC PEPTIDE (GSP): A NEW HORMONE OF THE GASTROINTESTINAL TRACT? (Ger.) Pointner, H. (I. Medizinischen Universitatsklinik, Lazarettgasse 14, A-1097 Vienna, Austria). *Fortschr. Med.* 95(17):1153-1154; 1977.

5191 PANCREOZYMIN RECEPTORS OF ACINUS CELLS. (Fre.) Robberecht, P.; Deschodt, M.; Christophe, J. (No affiliation given). *Rev. Fr. Gastroenterol.* (132):66-67; 1977.

5192 BIOENERGY PROCESSES IN THE LIVER IN ACUTE EXPERIMENTAL PANCREATITIS. (Rus.) Kriuchok, A. G.; Chumakov, V. N.; Smelianskaia, G. N. (Dept. Operative Surgery, Minsk Medical Inst., Minsk, USSR). *Patol. Fiziol. Eksp. Ter.* (4):37-40; 1976.

5193 PROFILES OF PURE PANCREATIC SECRETIONS IN NORMAL HUMAN SUBJECTS [Abstract]. (Eng.) Rinderknecht, H.; Renner, I. G.; Douglas, A. P.; Adham, N. F. (Veterans Admin. Hosp., Sepulveda, CA). *Clin. Res.* 26(2):151A; 1977.

5194 L-LEUCINE METABOLISM IN THE EXOCRINE PANCREAS OF THE RAT [Abstract]. (Eng.) Vincent, D.; Bauduin, H. (Lab. Biochemical Pharmacology, Free Univ. Brussels, Brussels, Belgium). *Digestion* 16(1/2):219-220; 1977.

5195 SPECIFIC HORMONAL REGULATION OF HUMAN PANCREATIC SECRETION [Abstract]. (Eng.) Kalbermatten, N. de; Bambule-Dick, J.; Felber, J. P. (Departement de Medecine, C.H.U.V., 1011 Lausanne, Switzerland). *Digestion* 16(1/2):211; 1977.

5196 COMBINED EFFECT OF CYTOCHALASIN B, VINBLASTINE AND DEUTERIUM OXIDE ON CAERULEIN-INDUCED ENZYME RELEASE IN THE EXOCRINE PANCREAS OF THE RAT [Abstract]. (Eng.) Stock, C.; Launay, J. F.; Bauduin, H. (INSERM U 61, Strasbourg, France). *Digestion* 16(1/2):218-219; 1977.

5197 POST-PRANDIAL TRYPSINOGEN SECRETION AND ITS GASTRIC INHIBITORY EFFECT IN DOG [Abstract]. (Eng.) Mendes de Oliveira, J. P.; Demol, P.; Singer, M.; Tiscornia, O. M.; Sarles, H. (INSERM U 31, 46 chemin de la Gaye, 13009 Marseille, France). *Digestion* 16(1/2):215-216; 1977.

5198 EFFECT OF CHRONIC IRRITATION OF SPLANCHNIC NERVES ON PANCREATIC SECRETION IN THE DOG [Abstract]. (Eng.) Castello, H. B.; Sarles, J. C. (Hopital Nord, Marseille, France). *Ir. J. Med. Sci.* 146(Suppl. 1):22-23; 1977.

5199 ACTION OF A SYNTHETIC ANALOGUE OF PROSTAGLANDIN E_2 ON EXOCRINE AND ENDOCRINE PANCREAS IN THE RAT [Abstract]. (Eng.) Dodi, G.; Santoro, G.; Jaffe, B. M. (Dept. Surgery, Univ. Padova, Padova, Italy). *Ir. J. Med. Sci.* 146 (Suppl. 1):22; 1977.

See also, 5074, 5231, 5283, 5288, 5303, 5304, 5323, 5332, 5365, 5424, 5486, 5500, 5632, 5822.

SECRETION AND METABOLISM

Hepatobiliary Tract

5200 FREE RADICAL PEROXIDATION OF LIVER MITOCHONDRIAL AND MICROSOMAL PHOSPHOLIPIDS IN RAT POSTNATAL DEVELOPMENT. (Rus.) Lankin, V. Z.; Tikhaze, A. K.; Kotelevtseva, N. V.; Markelova, V. I. (All-Union Cardiological Res. Center, Moscow, USSR). *Biokhimiia* 42(7):1292-1297; 1977.

Characteristic features of enzymatic and nonenzymatic peroxidation of the phospholipids in liver mitochondria and microsomes during postnatal development were studied in Wistar rats. The mitochondria and microsomes were obtained from newborn and 1-, 2-, 4-, 8-, 10-, 12-, 14-, 18-, 24-, and 32-week-old rats. Activity of ascorbate-dependent (nonenzymatic) peroxidation showed a marked increase (both in the mitochondria and microsomes) up to the 4th week of the postnatal period, the maximal activity of NADPH-dependent peroxidation as observed in 8-week-old rats. These findings indicate that the maximal activity of both enzymatic and nonenzymatic peroxidation coincides with the maximal growth rate.

5201 MICROSOMAL OXIDATIVE DECOMPOSITION OF FOREIGN SUBSTANCES IN THE HUMAN LIVER.

OXIDATIVE DECOMPOSITION OF LIVER MICROSOMAL FRACTION FROM NEEDLE BIOPSY SPECIMEN, AS EXEMPLIFIED BY COUMARIN-7-HYDROXYLASE AND 7-ETHOXYCOUMARIN HYDROXYLASE IN HUMAN SUBJECTS WITH NORMAL LIVER AND IN PATIENTS WITH LIVER DISEASES. (Ger.) Kratz, F. (Zentrum fur Innere Medizin, Klinikum der Univ., Klinikstrasse 36, 6300 Giessen, W. Germany). *Fortschr. Med.* 96(8):393-397; 1978.

To investigate the oxidative metabolism of foreign substances in the liver, the coumarin-7-hydroxylase (C7H) and 7-ethoxycoumarin hydroxylase (7ECH) activities of liver microsomal fractions obtained from needle biopsy specimens were studied in normal subjects and in patients with various liver diseases. The C7H specific activity was 0.26-0.35 nmol/mg/min in 135 men and women with normal livers. The 7ECH specific activity in 88 control subjects with normal livers was 0.09-0.14 nmol/mg/min. The enzyme activities showed no sex- or age-related differences. The C7H specific activity was reduced significantly ($p<0.05$) during the early stage and peak of acute viral hepatitis (0.04 nmol/mg/min); in chronic aggressive hepatitis (0.10 nmol/mg/min); in alcoholic, hepatitis, and histologically active liver cirrhosis (0.11, 0.11, and 0.09 nmol/mg/min, resp.); in chronic alcoholic hepatitis (0.10 nmol/mg/min); and in other forms of chronic hepatitis with fatty liver (0.16 nmol/mg/min). However, there was no significant difference from the controls during the recovery stage from acute viral hepatitis, chronic persistent hepatitis, cryptogenic and histologically inactive liver cirrhoses, or alcoholic and diabetic fatty liver. The specific 7ECH activity was reduced significantly ($p<0.05$) during the early stage and peak of acute viral hepatitis (0.02 nmol/mg/min); chronic aggressive hepatitis (0.05 nmol/mg/min); alcoholic, hepatitic, and histologically inactive liver cirrhosis; and chronic hepatitis with fatty liver. The findings show that the oxidative metabolism of foreign substances in the liver may be altered significantly in liver diseases.

5202 COMBINED ACTION OF PYRAZOLE AND ETHANOL ON A RAT LIVER: HISTOCHEMICAL AND ULTRASTRUCTURAL STUDY. (Eng.) Skladzinski, J.; Beskid, M. (Center Postgraduate Medical Education, Marymoncka 99, Warsaw, Poland). *Folia Histochem. Cytochem.* 16 (1):13-18; 1978.

The effect of combined single-dose feeding of pyrazole (36 mg/kg daily) and ethanol (8.0 g/kg daily) was studied in the livers of male Wistar rats and compared to the effects of feeding the agents successively (pyrazole first) at a 30-min interval once or twice in 24 hr, feeding only one agent, or feeding neither (controls). After 30 days, the animals were sacrificed and the liver removed for histochemical and electron microscopic examination. No marked damage of the liver was noted when pyrazole alone was given. Feeding with ethanol alone induced slight morphological alterations in the liver. However, the combined administration of pyrazole and ethanol either together or successively had a highly toxic action leading to severe damage of the liver cells including small foci of necrosis (1 dose/24 hr) or massive necrosis (2 doses/24 hr). Histochemical examination revealed that pyrazole and ethanol administration led to fatty liver with an accompanying acid phosphatase reaction of varying intensity, the reaction being greatest in animals receiving two doses of drugs in 24 hr; succinic dehydrogenase activity also decreased most markedly in the latter animals. Ultrastructurally, electron microscopy revealed a marked increase of smooth endoplasmic reticulum and an accompanying decrease of rough endoplasmic reticulum, a swelling of the mitochondria and numerous liposomes, and lipid droplets in animals fed ethanol and pyrazole once in 24 hr. The picture of cytoplasmic damage was more severe in animals fed the agents twice in 24 hr. It is concluded that the metabolic block of ethanol oxidation induced by pyrazole causes an enhancement of the toxic effect of ethanol on the cell previously damaged by pyrazole. A similar situation may occur with other drugs, which unintentionally would produce a hepatotoxic effect.

5203 INFLUENCE OF DOPAMINE ON LIVER DYNAMICS IN HEMORRHAGIC SHOCK. (Eng.) Trachte, G. J.; Lefer, A. M. (Jefferson Medical Coll., 1020 Locust St., Philadelphia, PA 19107). *Circ. Shock* 4(4):305-315; 1977.

The effect of dopamine on arterial blood pressure, liver blood flow, cathepsin D activity, and free amino nitrogen concentration was investigated in male cats in hemorrhagic shock. Dopamine infusion (4 µg/kg/min) increased both mean arterial blood pressure ($p<0.025$) and liver blood flow ($p<0.05$) in postoligemic shock, but failed to prevent the marked increases in circulating cathepsin D and free amino nitrogen. Dopamine infusion resulted in an increased plasma cathepsin D activity in shock in comparison with that in sham-shocked animals ($p<0.001$). This increased accumulation of a lysosomal marker enzyme probably results from increased washout of the enzyme from the splanchnic or hepatic vascular bed in response to increased blood flow in these areas rather than from a direct effect of dopamine on lysosomal integrity. The increase in hepatic artery and portal vein flows appeared to result from stimulation of dopaminergic receptors, since the dopamine dose was in the dopaminergic range and because haloperidol (5 µg/ml), a dopamine blocker, abolished the improved hemodynamic effects of dopamine. This study suggests that dopamine benefits the animal in hemorrhagic shock hemodynamically, but does not reverse the metabolic and cellular problems in shock. Perhaps, in combination with a drug opposing the biochemical basis of shock, dopamine may provide a greater anti-shock action.

5204 ADAPTIVE CHANGES OF THE RAT LIVER CELLS INDUCED BY REPEATED INTRAPERITONEAL INJECTIONS OF D-GALACTOSAMINE. II. LIGHT AND ELECTRON MICROSCOPIC INVESTIGATIONS OF HEPATOCELLULAR NUCLEOLAR ALTERATIONS. (Eng.) Enzan, H.; Haberle,

B.; Meinhardt, K.; Schuchhardt, C.; Koch, H. K.; Lesch, R. (Res. Inst. Nuclear Medicine and Biology, Univ. Hiroshima, Kasumi-cho 1-2-3, 734 Hiroshima, Japan). *Virchows Arch. [Cell Pathol.]* 26(1):59-71; 1977.

To investigate the active hepatocellular response to d-galactosamine (GalN) and the relationship between structure and function in liver cells of GalN-treated rats, the effects of repeated GalN administration (i.e., subacute GalN intoxication) on rat liver cell nucleoli were examined. After an initial i.p. injection of GalN (375 mg/kg), the rats were treated with 250 mg GalN/kg body weight daily at intervals between 24 hr and 30 days. The rats were sacrificed 6 hr after the last injection by decapitation. Liver specimens were studied by light and electron microscopy. According to the nucleolar size, three stages were distinguished: (1) stage I, decreased nucleolar size after one injection; (2) stage II, increased and maximal nucleolar size after two to five injections; and (3) stage III, slightly increased relatively stable nucleolar size after six or more injections. The fine structural observations suggest a nucleolar hyperfunction in subacute GalN intoxication as well as a minor disturbance of the transcription and the transfer of the nucleolar RNA.

5205 RELATION OF THE SIZE OF FUNCTIONAL HEPATIC CELL MASS TO THE CLEARANCE OF INDOCYANINE GREEN. (Eng.) Kojima, H. (Nagoya Univ. Sch. Medicine, Nagoya, Japan). *Nagoya J. Med. Sci.* 40(1):47-55; 1978.

Because the fractional clearance (K) of indocyanine green (ICG) is considered to be indicative of the amount of functional hepatic cell mass as well as the degree of hepatocellular damage, the correlation between K of ICG and the size of hepatic cell mass altered by functional hepatectomy as well as the degree of hepatic damage induced by carbon tetrachloride (CCl_4) was investigated in the dog. A <20% functional hepatectomy produced only a minimal decrease (-3.3 ± 1.5% for 13.7 ± 3.1% hepatectomy) in K of ICG, probably due to the potential functional reserve of the liver, while in dogs with a >70% functional hepatectomy, K of ICG was remarkably decreased (-44.0 ± 6.3 to -72.4 ± 3.3% for 71.5 ± 2.9 to 86.8 ± 2.5% hepatectomy). K of ICG was negatively correlated ($r=-0.88$, $p<0.001$) with the magnitude of functional hepatectomy, i.e., the size of remaining functional hepatic cell mass. Large doses of CCl_4 (1.0, 1.5, and 2.0 ml/kg, i.v.) induced remarkable decreases (-10.8 ± 19.2, -11.5 ± 21.0, and -52.6 ± 12.2%, resp.) in K of ICG, associated with the increasing degrees of hepatic cell necrosis, whereas CCl_4 in smaller doses (0.5 and 1.0 ml/kg, i.v.) activated hepatic cell function as reflected by higher K values (22.9 ± 1.8 and 20.3 ± 15.9%, resp.). It is concluded that K of ICG is a reliable indicator of hepatic cell function in acute or subacute hepatic cell damage.

5206 EFFECT OF PHENOBARBITAL AND DIETHYL MALEATE ON CARBON TETRACHLORIDE TOXICITY IN ISOLATED RAT HEPATOCYTES. (Eng.) Lindstrom, T. D.; Anders, M. W.; Remmer, H. (Dept. Pharmacology, Univ. Minnesota, Minneapolis, MN 55455). *Exp. Mol. Pathol.* 28(1):48-57; 1978.

The effects of phenobarbital (PB) and the glutathione depleting agent, diethyl maleate (DEM), on CCl_4 hepatotoxicity were investigated in isolated rat hepatocytes. The administration of DEM (0.6 mg/kg, i.p.) significantly decreased hepatocyte glutathione (GSH) levels both *in vivo* and *in vitro*. The addition of CCl_4 (400 and 800 µg/ml) to hepatocyte suspensions resulted in increased malondialdehyde formation in cells isolated from DEM- or DEM plus PB-treated rats. Both concentrations of CCl_4 increased lactate dehydrogenase release in cells isolated from DEM-plus PB-treated rats; however, 800 µg/ml, but not 400 µg/ml, of CCl_4 caused moderate lactate dehydrogenase (LDH) release in cells isolated from DEM-treated rats. Treatment with PB alone resulted in increased LDH release in hepatocytes exposed to 800 µg/ml of CCl_4; no significant effects were observed at the 400 µg/ml level. However, hepatocytes isolated from rats treated with PB alone did not exhibit significant malondialdehyde formation at either 400 or 800 µg/ml of CCl_4. The addition of 800 µg/ml of CCl_4 to hepatocytes isolated from PB-treated rats produced maximal LDH release, which was not further increased by treatment with DEM. These results show that an increased rate of CCl_4 bioactivation produces a more prominent effect on LDH release than on malondialdehyde formation; in contrast, lowered levels of reduced glutathione were associated with increased malondialdehyde formation.

5207 EFFECT OF PHENOBARBITAL ON THE INTRAHEPATIC METABOLISM OF BILIRUBIN. (Rus.) Oleinik, A. N. (Medical Inst., Ternopol, USSR). *Klin. Med. (Mosk.)* 56(2):27-33; 1978.

Various aspects of the effect of phenobarbital (PB) on the formation, transport, and excretion of bilirubin are reviewed. Single and repeated administration of PB to random bred rats (3-10 mg/100 g) stimulated the excretory function of the liver: there was a 3.5-4.5-fold increase in the total amount of the pigment excreted into the bile. PB was used in the treatment of various liver and biliary duct diseases, especially of those accompanied by hyperbilirubinemia. The efficacy of PB was markedly greater in the patients with Gilbert's syndrome than in patients with Crigler-Najjar syndrome. Administration of PB in minimal sedative doses (0.02 mg/day) to women during the last days (weeks) of pregnancy was found to be effective against the physiological jaundice of newborns. PB (0.03 g, t.i.d. for 10 days) was effective against both early and long-term residual manifestations of acute viral hepatitis.

5208 AN ANALYSIS OF DATA ON HUMAN HEPATIC BILE. RELATIONSHIP BETWEEN MAIN BILE COMPONENTS, SERUM CHOLESTEROL AND SERUM TRIGLYCERIDES. (Eng.) van der Linden, W.; Bergman, F. (Lasarettet, S-831

01 Ostersund, Sweden). *Scand. J. Clin. Lab. Invest.* 37(8):741-747; 1977.

Data on serum and hepatic bile from 97 patients were subjected to statistical analysis to determine the relationship between different bile constituents and serum cholesterol and triglycerides. Hepatic bile samples were obtained from the common duct during operations for uncomplicated gallstone disease; serum cholesterol and triglycerides levels were determined prior to operation. A highly significant rank correlation was found between the cholesterol and phospholipid molar fractions (r_S=0.37, p<0.001). The rank correlation between the cholesterol molar fraction and the bile acid/phospholipid ratio was significant and negative (r_S=-0.58, p<0.001), suggesting that a rise of cholesterol in human bile is accompanied by a decrease of the bile acid/phospholipid ratio as is the case in all animal models studied so far. A significant correlation (r_S=0.28, p<0.01) was found between chenodeoxycholic acid (CDCA) and the ratio between cholic acid (CA) and deoxycholic acid (DCA). Low CDCA values were associated with high lithogenicity and low DCA values with low lithogenicity. In a mathematical function representing the relationship between the biliary cholesterol/serum cholesterol ratio and the bile acid pattern, the ratio rose with increasing DCA values and with increasing absolute differences between the CDCA and CA levels, confirming the impression obtained from the experimental data. Statistical analysis confirmed the significance of the apparent correlation (r_S=0.31, p<0.001). There were significant correlations between the serum triglyceride level and the cholesterol molar fraction (r_S=0.25, p<0.01) and between the triglyceride level and the phospholipid molar fraction (r_S= 0.28, p<0.01). Serum triglycerides were negatively correlated with the bile acid molar fraction (r_S= -0.32, p<0.001) and with the absolute concentration of bile acids (r_S=-0.26, p<0.01), resulting in an association between serum triglycerides and lithogenicity.

5209 INHIBITION OF BILE SALT EXCRETION AND BILE FLOW BY SPASMOLYTIC DRUGS: AN ADDITIONAL THERAPEUTIC EFFECT OF BILIARY COLICS? (Eng.) Klapdor, R.; Sepehr, H. (Universitats-Krankenhaus Eppendorf, Martinistr. 52, 2000 Hamburg 20, W. Germany). *Arzneim. Forsch.* 28(1):46-48; 1978.

Studies were carried out to determine whether the therapeutic effect of spasmolytic drugs in biliary colic might be caused by the depression of intraluminal pressure due to a decrease in bile salt-dependent bile flow. The influence of the spasmolytic drugs hyoscin-*N*-butylbromide (HBB) and Extractum opii (E. opii) on bile flow, bile salt excretion, and bilirubin excretion was investigated in cholecystectomized, unanaesthetized pigs, and the results were compared with those after acute, quantitative interruption of the enterohepatic circulation (EHC) by biliary drainage. Both HBB (0.46 ± 0.04 mg/min/kg, 60 min, i.v.) and E. opii (0.6 ± 0.3 drops/min/kg, intraduodenally) induced a marked decrease in both bile flow (to 55 ± 4% and 74 ± 25% of initial values by HBB and E. opii, resp.) and bile salt excretion (to 25 ± 16% and 51 ± 23% of initial values by HBB and E. opii, resp.). These decreases showed a significant linear correlation whether induced by HBB or E. opii (r=0.994, p<0.01 and r=0.983, p<0.01, resp.). Interruption of the EHC by biliary drainage decreased bile flow to 10 ± 5% of the initial value and bile salt excretion to 55 ± 5% of the initial value; these decreases also showed a significant linear correlation (r=0.963, p<0.01). Bilirubin excretion was unchanged by interruption of the EHC, by HBB, or by E. opii. These results support the hypothesis that these spasmolytic drugs lower the intraluminal pressure by inhibiting bile salt-dependent bile flow.

5210 ALTERATIONS IN BILE FLOW AND Na^+-K^+ BILIARY EXCRETION INDUCED BY THEOPHYLLINE AND ETHACRYNIC ACID. (Eng.) Knodell, R. G. (Veterans Admin. Hosp., Albuquerque, NM 87108). *Proc. Soc. Exp. Biol. Med.* 157(2):306-311; 1978.

To investigate the mechanism of the bile salt independent flow (BSIF) and the bile salt dependent flow (BSDF) of hepatic canalicular bile, the effectiveness of theophylline (a phosphodiesterase inhibitor) and ethacrynic acid (a Na^+-K^+-ATPase inhibitor) in increasing BSIF bile production was investigated in male Walter Reed rats. Theophylline (TH, 20 mg/kg i.v.) was given 15 min before the start of bile collection, and ethacrynic acid (EA, 10 mg/kg i.v.) was given both 15 min before the start of bile collection and again halfway through the 1-hr collection period. ^{14}C-erythritol clearance showed a linear relationship to total bile flow and the bile/plasma ^{14}C ratios approximated unity and were not significantly different in control animals and in both the TH- and EA-treated groups, suggesting that the drugs did not alter bile flow. However, both agents significantly (p<0.001) increased the fraction of erythritol clearance that was independent of bile salt output (i.e., BSIF) compared to controls. TH produced a significant (p<0.001) decrease in the erythritol clearance generated per unit of bile acid secreted (i.e., in BSDF) compared to controls, while EA significantly increased (p<0.025). Bile flow was linearly related to total Na^+ biliary excretion and there was no significant difference in the amount of bile flow generated per unit of Na^+ excretion in all three groups. But TH and EA caused an increase (p<0.05 for TH) in the Na^+-independent bile flow, compared to controls. The amount of bile secreted per unit of biliary K^+ excreted was increased by both TH (p<0.05) and EA, and both agents caused a significant increase (p<0.05) in K^+-independent bile flow. It is concluded that both agents significantly enhance BSIF. However, they also produced alterations in BSDF flow that suggest that they influence multiple steps in the bile secretory process.

5211 BILIRUBIN DYNAMICS IN THE GUNN RAT DURING PHOTOTHERAPY. (Eng.) Calvert, R. T.; Hulshoff, A.; Buice, R. G.; Kostenbauder, H. B.

(Dept. Pharmacy, Univ. Manchester, Manchester M13 9PL, England). *J. Pharm. Sci.* 67(2):205-209; 1978.

To develop a kinetic model for the formation, distribution, and elimination of bilirubin, bilirubin dynamics were studied in homozygous Gunn rats under normal room lighting conditions and under conditions simulating phototherapy. Each rat received an i.v. ^{14}C-bilirubin dose of 200,000-660,000 disintegrations/min. The decrease in plasma bilirubin concentration during illumination with low intensity (300 footcandles, fc) or high intensity (1,000-1,100 fc) was studied. The plasma bilirubin concentration decreased under phototherapy until a new steady-state concentration was reached, with the decline being more rapid under high intensity light conditions. The rats were also injected with a tracer dose of ^{14}C-bilirubin following a period of illumination with low or high intensity light. The distribution and elimination of the labeled bilirubin were then followed under continuous illumination. The data obtained from these experiments were computer fitted to 10 kinetic models, one of which was determined to be the best possible model to account for both the low and high intensity light data. The selected model is a three-compartment model with zero-order elimination from the slowly miscible peripheral compartment.

5212 CHARACTERISTICS OF α-FETOPROTEIN-CONTAINING HEPATOCYTES IN THE REGENERATING MOUSE LIVER. (Rus.) Lazareva, M. N. (N.F. Gamaleya Inst. Epidemiology and Microbiology, Moscow, USSR). *Biull. Eksp. Biol. Med.* 84(7):97-101; 1977.

To evaluate the characteristic features of localization of α-fetoprotein (α-FP) in regenerating rat liver, SWR mice were exposed to CCl_4 vapors (0.001-0.005 ml/3 l); on day 2-3 after intoxication mice were sacrificed and the location of α-FP in the liver sections was assayed by an indirect immunofluorescence technique. Intoxication with CCl_4 induced synthesis of α-FP; the increase depended upon the age of the mice. In 13-day-old mice, α-FP was detected in 30% of hepatocytes, compared with 15-20% in 3-week-old mice and 5-7% in 2- to 3-month-old mice. The majority of α-FP-containing hepatocytes were located in the region adjacent to the necrosis foci.

5213 EFFECT OF KUPFFER CELL BLOCKADE AT DIFFERENT PERIODS BEFORE AND AFTER PARTIAL HEPATECTOMY ON HEPATOCYTE REGENERATION. (Rus.) Mayanskii, D. N.; Shcherbakov, V. I.; Mirokhanov, Iu. M. (Inst. Clinical and Experimental Medicine, Novosibirsk, USSR). *Biull. Eksp. Biol. Med.* 84(11): 616-618; 1977.

To evaluate the role of Kupffer cells in the processes of liver regeneration, partially hepatectomized Wistar rats were inoculated i.v. with a 10% suspension of carbonyl iron (1 ml). Animals were divided into three groups: rats in group 1 were inoculated 2 hr prior to the partial (2/3) hepatectomy, rats in group 2 were inoculated 3 hr after, and rats in group 3 were inoculated 18 hr after the hepatectomy. Rats were sacrificed 24, 32, 48, and 72 hr after partial hepatectomy, and at each time point the mitotic index (MI) and index of labeled mitoses (ILM) were measured. Inhibition of hepatocyte proliferation was detected in all rats treated with carbonyl iron, but the block of mononuclear phagocytes was more effective in rats from groups 1 and 2 and less effective in rats from group 3 (i.e., in the period of intensive DNA synthesis).

5214 ESTERASE SPECTRA IN HEPATOCYTES AND KUPFER'S CELLS OF THE REGENERATING LIVER. (Rus.) Grishanova, A. Yu.; Shcherbakov, V. I.; Mayanskii, D. N. (Inst. Clinical and Experimental Medicine, Novosibirsk, USSR). *Biull. Eksp. Biol. Med.* 84(7):44-46; 1977.

The starch gel electrophoresis assay was employed for evaluation of the multiple forms of esterase in hepatocytes and Kupffer cells derived from partially hepatectomized Wistar rats. The electrophoretogram of esterase from intact hepatocytes and Kupffer cells consisted of six and five bands, resp. Within the first 2-3 hr after hepatectomy, esterase spectra in both hepatocytes and Kupffer cells consisted of four bands each; 9 hr after hepatectomy, the spectra showed normalization. Complete normalization of the esterase pattern in the hepatocytes was detected 48 hr after hepatectomy, while in Kupffer cells deviations from the normal pattern were observed even 72 hr after hepatectomy.

5215 UNEVEN DISTRIBUTION OF ENZYMATIC ALTERATIONS ON THE LIVER CELL SURFACE IN EXPERIMENTAL EXTRAHEPATIC CHOLESTASIS OF RAT. (Eng.) Toda, G.; Kako, M.; Oka, H.; Oda, T.; Ikeda, Y. (First Dept. Internal Medicine, Univ. Tokyo, 3-1, Hongo 7-chome, Bunkyoku, Tokyo, Japan). *Exp. Mol. Pathol.* 28(1):10-24; 1978.

The effect of bile duct ligation on enzyme activities in the subfractions of the rat liver plasma membrane was investigated. Two subfractions were isolated from the rat liver plasma membrane by homogenization and subsequent centrifugation in a discontinuous sucrose gradient. The light subfraction contained fragments of the bile canalicular surface and the heavy subfraction contained fragments of the sinusoidal and lateral surfaces of the hepatocyte. Bile duct ligation decreased Na-K-ATPase and Mg-ATPase activity in the light subfraction, whereas it had no significant effect on these enzyme activities in the heavy subfraction. Leucyl-β-naphthylamidase activity was reduced and alkaline phosphatase activity was increased in both subfractions. These results suggest that the bile duct ligation leads to loss of the secretory polarity of the liver cell. The *in vitro* effects of some bile acids (taurine conjugates of cholate, chenodeoxycholate, lithocholate, and ursodeoxycholate) on the membrane-bound enzymes in the light subfraction were investigated. Taurocholate did not inhibit Na-K-ATPase activity even at 10 mM, whereas the same concentration of taurochenodeoxycholate and taurolithocholate inhibited it completely.

Mg-ATPase activity was inhibited by 25% at 10 mM taurocholate, and increasing the concentration to 100 mM did not enhance the extent of inhibition. Taurochenodeoxycholate and taurolithocholate at 100 mM inhibited Mg-ATPase activity by 65% and 85%, resp. These results indicate that taurine conjugates of chenodeoxycholate and lithocholate inhibit both Na-K ATPase and Mg-ATPase activities in the light fraction, whereas taurine conjugates of cholate and ursodeoxycholate are far less inhibitory. These results may be consistent with the hypothesis that chenodeoxycholic acid is involved in the alteration of enzyme activities in the bile canalicular membrane.

5216 EXPERIMENTAL STUDIES ON ETIOLOGY OF PORTAL HYPERTENSION IN ALLERGIC ASPECT. (Eng.)
Nakao, M.; Nagaishi, T.; Inoue, M.; Kimachi, H.; Koga, S. (Tottori Univ. Sch. Medicine, Yonago, Tottori Prefecture, Japan). *Jpn. J. Surg.* 7(4): 269-278; 1977.

The role of allergic factors in the etiology of portal hypertension in Banti's syndrome (idiopathic portal hypertension) was examined in healthy adult rabbits that had been sensitized by intragluteally injected ovalbumin (3 ml of 1% suspension at 3-day intervals for up to 200 days). The splenic weight was 0.9 g in the control group but ranged from 3.0 to 5.9 g in the sensitized group. The spleen tended to be atrophied in the late stage of sensitization and showed fibroplasia. The liver showed a slight swelling tendency in the sensitized rabbits. Liver cells in the late stages of sensitization showed hypochromasia, swelling and anisocytosis, and irregular hepatic cords. Portal hypertension was detected in 80% of sensitized rabbits. Injection of 30 ml of ovalbumin into a blocked and evacuated portion of the upper jejunum 3 days after the end of the sensitization period resulted in an increase in portal pressure in 80% of the sensitized rabbits compared with no change in controls. The degree of induced portal pressure elevation was not affected by the duration of sensitization. Injection of the antigen into various other sites indicated that the pressure-elevating mechanism operates at sites central to the area of the superior mesenteric vein (probably at the hepatic level). It is suggested that the pressure elevation arises from an antigen-antibody reaction caused by absorption of the intraintestinally injected antigen into the portal system with its antigenicity maintained, suggesting the importance of alimentary factors in the genesis of this syndrome.

5217 SODIUM RETENTION AND ASCITES FORMATION IN DOGS WITH EXPERIMENTAL CIRRHOSIS. (Eng.)
Levy, M. (Dept. Physiology, McGill Univ., Montreal, Quebec H3G 1Y6, Canada). *Am. J. Physiol.* 233(6):F572-F585; 1977.

To study the temporal relationships between urinary sodium retention, plasma volume expansion, and ascites formation, liver cirrhosis was induced in dogs by the sporadic feeding of dimethylnitrosamine (0.10-0.15 ml on 2 consecutive days). Sodium retention started about 16 days following the onset of cirrhosis and preceded ascites formation by about 10 days. Plasma volume increased by 9% ($p<0.05$) within 3 to 4 days of sodium retention and expanded further as ascites accumulated. Splanchnic plasma volume was greater by 161 ml in 10 cirrhotic dogs with ascites than in 14 normal dogs. Nonsplanchnic volume was greater by 96 ml ($p<0.05$). Thus, the "effective" as well as the splanchnic component of the vascular space was expanded. Paracentesis did not cause the reformation of ascites in five dogs as long as dietary salt was denied. Refeeding permitted reaccumulation of ascites and further plasma volume expansion. Renal perfusion remained constant as dogs became progressively cirrhotic. It is concluded that ascites formation depends on the prior retention of urinary sodium, and occurs as an "overflow" phenomenon. A contracted effective plasma volume does not appear to be necessary for continuing sodium retention.

5218 SODIUM RETENTION IN DOGS WITH CIRRHOSIS AND ASCITES: EFFERENT MECHANISMS. (Eng.)
Levy, M. (Dept. Physiology, McGill Univ., Montreal, Quebec H3G 1Y6, Canada). *Am. J. Physiol.* 233(6): F586-F592; 1977.

The efferent mechanisms for sodium retention were investigated in dogs with dimethylnitrosamine-induced cirrhosis and ascites. Renal micropuncture revealed that the single nephron glomerular filtration rate (GFR), proximal tubular TF/P inulin level, and distal delivery of filtrate remained normal throughout the course of cirrhosis, even after acute saline loading. Plasma levels of renin, aldosterone, estrogens, and progesterone remained normal in the salt-retaining nonascitic phase of cirrhosis, but rose when ascites was present. Blood pressure was normal throughout the period of observation, but cardiac output rose by 20% in advanced cirrhosis with ascites. Renal denervation and the infusion of alpha- or beta-adrenergic blocking agents to saline-loaded cirrhotic dogs with ascites did not induce a natriuresis. The left kidney responded normally to vasodilatation with intra-arterial acetylcholine bromide (60-80 μg/min), but even when systemic arterial pressure was simultaneously elevated with norepinephrine, no natriuresis ensued. The major efferent mechanism mediating the tubular retention of sodium has not yet been identified in this canine model of cirrhosis. A distal nephron site appears to be responsible for most of the sodium retention.

5219 THE EFFECT OF CHOLAGOGIC DRUGS ON VOLUMETRIC SODIUM EXCRETION IN RATS WITH EXPERIMENTAL LIVER DYSTROPHY. (Rus.)
Iakovlev, V. E. (Dept. Pharmacology, Medical Inst., Chernovtsy, USSR). *Farmakol. Toksikol.* 41(1):73-76; 1978.

The effect of cholagogic agents on sodium excretion was studied in random-bred rats with CCl_4-induced (0.4 ml/100 g/day, s.c., for 4 days) liver dysfunction. On day 3 from the initiation of intoxication, animals started to receive dehydrocholic acid (250 mg/kg), flamine (50 mg/kg), or sodium

selenite (30 µg/kg). The cholagogics were given for 7 days. Experimental liver dystrophy resulted in a significant decrease of sodium excretion (3.0 ± 0.22 µEq/hr compared to 4.1 ± 0.26 µEq/hr in intact controls, $p<0.01$). Administration of dehydrocholic acid, flamine, and sodium selenite increased sodium excretion (to 5.4 ± 3.9, 6.7 ± 0.45, and 6.4 ± 0.42 µEq/hr, resp., compared to 3.7 ± 0.35, 5.3 ± 0.37, and 4.4 ± 0.31 µEq/hr, resp., in controls; $p<0.01$, $p<0.05$, and $p<0.01$, resp.).

5220 ON THE PATHOGENESIS OF GALACTOSAMINE HEPATITIS. INDICATIONS OF EXTRAHEPATOCELLULAR MECHANISMS RESPONSIBLE FOR LIVER CELL DEATH. (Eng.) Liehr, H.; Grun, M.; Seelig, H. P.; Seelig, R.; Reutter, W.; Heine, W. D. (Dept. Medicine, Univ. Wurzburg, Josef-Schneider-Str. 2, D-8700 Wurzburg, W. Germany). *Virchows Arch.* [*Cell Pathol.*] 26(4): 331-344; 1978.

The action of galactosamine on isolated mast cells from male Wistar rats and alterations in the complement system during the course of galactosamine-induced injury were studied to evaluate the pathogenesis of galactosamine hepatitis. Galactosamine (0.01 ml of a 1 M solution) induced degranulation of 100% of the cells within 1 min. Degranulation was observed in 90-100% of the mast cells of the peritoneal fluid aspirated 10 min after the i.p. injection of 1 g/kg galactosamine; after 3 hr, degranulation of the mast cells in the intestine was complete but no degranulation was observed in other organs. Endotoxemia developed from 3 hr after galactosamine injection. Sequential measurements of the complement hemolytic activity during the course of galactosamine hepatitis in rats revealed a biphasic decrease; the first decrease (to 70% of normal) coincided with the first appearance of liver cell necrosis (0-9 hr), and the second decrease (to 20% of normal) coincided with massive cell death and inflammation (9-48 hr). Necrotic liver parenchymal cells accumulated the third component of the complement system at 24 hr. Mice of the NMRI strain, which have 0-30% of the hemolytic activity of the control C57BL strain, developed endotoxemia (72% at 6 hr, 83% at 12 hr, 87% at 48 hr) but did not develop liver cell necrosis or inflammation after galactosamine administration, whereas the C57BL mice did. It is concluded that two mechanisms act together to produce galactosamine-induced liver lesions: a series of extrahepatic events resulting in histaminemia, endotoxemia, and complement activation act synergistically with a biochemical alteration that occurs within the hepatocyte during galactosamine metabolism to produce liver cell necrosis and inflammation.

5221 EFFECT OF TRITON WR 1339 ON THE ULTRASTRUCTURE OF PARENCHYMAL AND STROMAL LIVER CELLS IN RATS WITH CHRONIC TOXIC HEPATITIS. (Rus.) Vakulin, G. M.; Korolenko, T. A.; Titova, V. G.; Yakobson, G. S. (Central Res. Lab., Medical Inst., Novosibirsk, USSR). *Tsitologiia* 19(11):1281-1284; 1977.

The ultrastructural manifestations of the protective effect of the detergent Triton WR 1339 (polyoxyethyl-tert-octylphenylmethylene) were studied in Wistar rats with CCl_4-induced chronic hepatitis. Four hours prior to the first CCl_4 inhalation (intoxication lasted 3 weeks), the animals received a single i.p. injection of Triton WR 1339 (85 mg/100 g); 21 days later, the animals were sacrificed, and liver specimens were analyzed under the electron microscope. Triton WR 1339 administration activated pinocytosis in hepatocytes and Kupffer cells, stimulated Golgi bodies, and enhanced phagocytosis by triton-filled lysosomes.

5222 THE MECHANISM OF DISTURBED ENERGY FORMATION IN ACUTE LIVER ISCHEMIA. (Rus.) Levandovsky, I. V.; Lyakhovich, V. V.; Panov, A. V.; Soloviev, V. N.; Tsyrlov, I. B.; Iksman, T. M. (Lab. Organ and Tissue Transplantation, USSR Acad. Medical Sciences, Moscow, USSR). *Biull. Eksp. Biol. Med.* 84(9):301-303; 1977.

The effect of acute ischemia or of treatment with ischemic toxin (IT) on mitochondrial respiration was studied in Wistar rats. *In vitro* treatment of the mitochondria with IT significantly accelerated the respiration process. Incubation of the IT-treated mitochondria with dithiotreitol or with cytochrome C decreased the rate of oxidation. Similar changes were observed in mitochondria isolated from rats with induced liver ischemia (ligation of hepatic artery and portal vein).

5223 LIVER COLLAGEN HYDROXYLATION IN MURINE SCHISTOSOMIASIS. (Eng.) Dunn, M. A.; Maragondakis, M. E.; Hait, P. K. (Albert Einstein Coll. Medicine, Bronx, NY 10461). *Biochim. Biophys. Acta* 538(2):328-333; 1978.

To evaluate the role of procollagen prolyl hydroxylase (PPH) in liver fibrosis, the activity of PPH was measured in fibrotic liver obtained from mice with hepatosplenic schistosomiasis, an animal model of the most prevalent form of human liver fibrosis. Measurable activity of PPH in fibrotic liver supernatants was 47-fold higher (2.22 ± 0.35 disintegrations/min[dpm]/mg liver protein) than that of normal liver (0.08 ± 0.05 dpm/mg liver protein). The effect of PPH inhibition on collagen synthesis in fibrotic liver slices was studied using 8,9-dihydroxy-7-methyl benzo[b]quinolizinium bromide (GPA 1734). This compound was shown in other systems to inhibit prolyl and lysyl hydroxylations by iron chelation at concentrations that did not affect total protein synthesis. The formation of non-dialyzable labeled hydroxyproline was inhibited by 40, 70, and 95% at 30, 50, and 100 µM GPA 1734, resp. Incorporation of proline into total liver protein was unaffected at 30 and 50 µM but was inhibited 20% at 100 µM GPA 1734. Underhydroxylated collagen synthesized by liver slices with GPA 1734 was extracted with neutral salt solution and was subsequently hydroxylated with partially purified PPH to the same extent as control material synthesized in the absence of GPA 1734. The increased activity of PPH in murine schistosomiasis, the

possibility that this enzyme may be rate-controlling in collagen deposition, and the possibility that its inhibition may be therapeutically useful in liver fibrosis warrant further study.

5224 THE ENTEROHEPATIC CIRCULATION OF BILE ACIDS IN MAN. (Eng.) Hofmann, A. F. (No affiliation given). *Clin. Gastroenterol.* 6(1): 3-24; 1977.

5225 SPECIFICITY AND INTERRELATION OF BILE ACID SYNTHESIS IN THE BABOON [Abstract]. (Eng.) Redinger, R. N.; Grace, D. M. (Univ. Hosp., London, Ontario, Canada). *Gastroenterology* 72(5, Part 2):1164; 1977.

5226 ENTEROHEPATIC CIRCULATION OF SILICON IN MAN [Abstract]. (Eng.) Dobbie, J. W.; Gray, M. J. B.; Imrie, C. W. (Glasgow Royal Infirmary, Glasgow, Scotland). *Gut* 18(5):A400; 1977.

5227 STUDIES ON THYROXINE-BINDING GLOBULIN (TBG); CARBOHYDRATE STRUCTURE AND LIVER BINDING [Abstract]. (Eng.) Zinn, A. B. (Case Western Reserve Univ., Cleveland, OH 44106). *Diss.. Abstr. Int.* [B] 38(2):672-B; 1977.

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5256 SPECIFICITY OF THE DISACCHARIDE EFFECT IN THE RAT. (Eng.) Michaelis, O. E.; Szepesi, B. (Nutrition Inst., Agricultural Res. Service, U.S. Dept. Agriculture, Building 307, Room 315, Agricultural Res. Center, East Beltsville, MD 20705). *Nutr. Metab.* 21(6):329-340; 1977.

See also, 5106, 5151, 5311, 5320, 5321, 5322, 5323, 5339, 5348, 5372, 5599, 5754, 5756, 5782.

5257 DEVELOPMENT OF DIGESTIVE ENZYMES IN THE PIGLET FROM BIRTH TO 8 WEEKS. II. INTESTINE AND INTESTINAL DISACCHARIDASES. (Eng.) Aumaitre, A.; Corring, T. (Station de Recherches sur l'Elevage des Porcs, INRA-CNRZ, F-78350 Jouy-en-Josas, France). *Nutr. Metab.* 22(4):244-255; 1978.

To understand the developmental pattern of disaccharidase in pigs, the changes of intestinal mucosa, protein, and lactase, maltase, and sucrase activities were followed in the piglet between day 105 of gestation and 8 weeks after birth. The total amount of mucosa collected was small in the duodenum but larger and similar in the jejunum and ileum, and it varied considerably with age, the mean weight being 26, 124, and 551 g at birth, 2 weeks, and 8 weeks, resp. The total amount of protein varied greatly among animals, especially for the first 2 weeks; after 21 days, the amount of protein in g/100 g fresh weight remained essentially constant. Lactase and maltase activities appeared during fetal life in the whole of the small intestine. Activity of sucrase was recorded after the first postnatal week. Lactase activity was high at birth (1,222 U) and reached a maximum at 1 week (2,963 U); maltase activity, which was low at birth (106 U), increased by the 8th week (15,324 U). Total activities of all enzymes were low in the duodenum; lactase was most active in the jejunum. Similar activities of maltase and sucrase were found in the two distal parts of the small intestine. The specific activity (related to protein content) of lactase was very high in the duodenum at birth, reached a maximum in all intestinal tissues at the end of the 1st week after birth, and decreased afterwards. Specific maltase and sucrase activities were higher in the 2nd week, decreased between the 2nd and 4th weeks, and either increased afterwards (maltase) or decreased to the 6th-8th week (sucrase). These developmental patterns should be taken into consideration in preparing diets for piglets at different early ages of weaning.

5258 SUBCELLULAR DISTRIBUTION OF HYDROLASE ACTIVITIES FOR GLYCINE AND LEUCINE HOMOPEPTIDES IN HUMAN JEJUNUM. (Eng.) Nicholson, J. A.; Peters, T. J. (Royal Postgraduate Medical Sch., Du Cane Rd., London, W12 OHS, England). *Clin. Sci. Mol. Med.* 54(2):205-207; 1978.

Since information on the subcellular distribution of peptidase is crucial for the interpretation of studies of peptide transport, the subcellular distribution of peptidase activities in the normal human jejunum against glycine and leucine homopeptides was investigated with an analytical fractionation technique. An 8,000 x *g*/min supernatant was prepared from homogenates of biopsy specimens and subjected to isopycnic centrifugation in a Beaufay automatic zonal rotor. The distribution of subcellular organelles in the gradient was established by measurement of organelle-specific marker enzymes. A sensitive fluorimetric assay for glycine peptidase was developed and used for the localization of peptidase activity with peptides composed of two to five glycine residues as substrates. Glycine peptidase activity was located in the cytosol and in the brush border membrane, but the distribution of activity varied markedly with the chain length of substrate: the longer the peptide the greater the proportion of activity associated with the brush border. Leucine peptidase showed a similar variation in cytosol brush border distributions. The results are consistent with concepts that suggest absorption and intracellular hydrolysis of small peptides and brush border digestion of larger peptides.

5259 EFFECTS OF VASCULAR PERFUSION ON THE ACCUMULATION, DISTRIBUTION AND TRANSFER OF 3-O-METHYL-D-GLUCOSE WITHIN AND ACROSS THE SMALL INTESTINE. (Eng.) Boyd, C. A. R.; Parsons, D. S. (Dept. Physiology, Univ. Dundee, Dundee DD1 4HN, Scotland). *J. Physiol. (Lond.)* 274:17-36; 1978.

The influence of vascular flow on the transfer of the nonmetabolized, "actively transported" sugar 3-*O*-methyl-D-glucose (3MG) across the small intestinal epithelium was examined in vascularly perfused anuran intestine. Transfer was studied during absorption in the steady state and also during the period of transition from one steady state to another. During the steady state, the rate of absorption of 3MG from the intestinal lumen was equal to the rate of appearance in the portal venous effluent; this rate of transfer was directly related to the rate of arterial perfusion ($r=0.70$, $p<0.05$). With phlorizin (5×10^{-5} M) in the intestinal lumen, transfer across the epithelium was reduced to very low rates, which were independent of the rate of vascular perfusion. The apparent size of the tissue pool(s) of 3MG that had to be loaded to achieve the steady state rate of transfer were less than those that unloaded into the vascular bed after 3MG was removed from the intestinal lumen. This "up-down asymmetry" was abolished when phlorizin was present in the intestinal lumen during the unloading phase. When 3MG was abruptly removed from the intestinal lumen after the tissue had been previously loaded with the sugar, the rate of washout into the vascular bed could be described by the sum of two exponential terms. The two terms differed in that the rate constant of the earlier "fast" term was sensitive to the rate of vascular perfusion, while the later "slow" rate constant was insensitive to flow rate. The total quantity of 3MG that could be unloaded from the tissue into the portal venous effluent was decreased when phlorizin was present in the intestinal lumen during the unloading phase. Absorption from the lumen of the anuran intestine continued while the mesenteric circulation was interrupted. An estimate of the concentration of 3MG during the period of vascular stoppage could be made from the quantity recovered in the portal venous effluent when vascular per-

fusion was reinstituted ("vascular stop-flow"). The extent of the accumulation depended upon the duration of the vascular stoppage, and the presence of Na ions in the intestinal lumen was essential for accumulation to occur. The findings are discussed in relation to the transfer of 3MG between various possible compartments in the tissue during absorption. Evidence is presented that a re-uptake of previously absorbed 3MG may occur across the brush border membrane. Such a recycling of 3MG across the epithelium implies that the apparent unidirectional fluxes measured across the epithelium between the bulk phase of the lumen and the blood may underestimate the size of fluxes across the epithelium at the cellular level.

5260 INHIBITION OF VIP-STIMULATED INTESTINAL SECRETION AND CYCLIC AMP PRODUCTION BY SOMATOSTATIN IN THE RAT. (Eng.) Carter, R. F.; Bitar, K. N.; Zfass, A. M.; Makhlouf, G. M. (Medical Coll. Virginia, Richmond, VA 23298). *Gastroenterology* 74(4):726-730; 1978.

To determine the roles of vasoactive intestinal peptide (VIP) and somatostatin in the control of intestinal transport, the effect of somatostatin on colonic secretion induced by 10^{-8} M VIP, 10^{-2} M theophylline, and 2×10^{-3} M dibutyryl cyclic AMP (cAMP) was studied in muscle-stripped everted open rat colon sacs. The secretory response to VIP, measured as the decrease in net absorptive flow rate (µl/30 min/mg of dry weight), was maximal and equalled the responses to theophylline or cAMP. Somatostatin (10^{-5} M) blocked completely the secretory response to VIP but only partially the secretory response to theophylline or cAMP. This difference in the extent of inhibition suggested that somatostatin exerted an inhibitory effect both before and after the point of generation of intracellular cAMP. To test the hypothesis that one component of the action of somatostatin involved inhibition of the production of cAMP, measurements of this nucleotide were made in isolated rat colon cells. Control levels of cAMP measured by radioimmunoassay (12.6 ± 1.6 pmol/10^6 cells) were not affected by 10^{-5} M somatostatin. VIP (5×10^{-8} M) increased cAMP levels twofold ($p<0.01$), and this increase was blocked by somatostatin. The results indicate that somatostatin inhibits colonic secretion by exerting effects at two sites: one site lies at, and another beyond, the point of generation of intracellular cAMP.

5261 THE DRUG AND CARCINOGEN METABOLISM SYSTEM OF RAT COLON MICROSOMES. (Eng.) Fang, W. F.; Strobel, H. W. (Univ. Texas Medical Sch. at Houston, Houston, TX 77025). *Arch. Biochem. Biophys.* 186(1):128-138; 1978.

The drug and carcinogen metabolizing systems of rat colon mucosal enzymes were studied, and the isolation of the microsomes is described. The hydroxylation of *N*- and *O*-methyl drugs and polycyclic hydrocarbon was demonstrated in the microsomes. The hydroxylation of benzphetamine, ethylmorphine, *p*-nitroanisole, and *p*-nitrophenatole by colon microsomes was inducible two- to fourfold by pretreatment with phenobarbital/hydrocortisone. Colon microsomal benzo[α]pyrene hydroxylation was inducible 35-fold by pretreatment with β-naphthoflavone. Phenobarbital/hydrocortisone pretreatment also induced a fourfold increase in the specific content of colon microsomal cytochrome P-450, while β-naphthoflavone pretreatment caused a shift in the CO-reduced difference spectrum peak to 448 nm and an eightfold increase in the specific content of P-450. SKF 525-A (2-diethylaminoethyl-2,2-diphenylvalerate HCl), 2.0 mM, inhibited the hydroxylation of the drug benzphetamine by colon microsomes or liver microsomes by 77%. 7,8-Benzoflavone, 10 µM, inhibited the hydroxylation of the polycyclic hydrocarbon benzo[α]pyrene by colon microsomes by 76% and by liver microsomes by 44%. CO inhibited benzphetamine hydroxylation and benzpyrene hydroxylation by colon microsomes 30% and 51%, resp., at an O to CO ratio of 1:10. The K_m values of colon microsomal cytochrome P-450 reductase for the artificial electron acceptors cytochrome c, dichloroindophenol, and ferricyanide (10-77 µM) were in agreement with those for purified rat liver cytochrome P-450 reductase. These data support the conclusions that hydroxylation of drugs and polycyclic hydrocarbons is catalyzed by colon mucosal microsomes and that the hydroxylation activity is attributable to a cytochrome P-450-dependent drug metabolism system similar to that found in liver microsomes.

5262 XYLOSE CATABOLISM IN THE EXPERIMENTAL RAT BLIND LOOP SYNDROME: STUDIES, INCLUDING USE OF A NEWLY DEVELOPED d-[^{14}C]XYLOSE BREATH TEST. (Eng.) Toskes, P. P.; King, C. E.; Spivey, J. C.; Lorenz, E. (Veterans Admin. Hosp., Gainesville, FL 32602). *Gastroenterology* 74(4):691-697; 1978.

To investigate the characteristics of malabsorption seen in the blind loop syndrome, intraluminal bacterial catabolism of xylose in an experimental rat blind loop model was evaluated by means of a newly developed *d*-[^{14}C]xylose breath test. The system affords frequent determination of total CO_2 and $^{14}CO_2$ and the opportunity for post-therapy evaluation. Rats with jejunal self-filling blind loops expired 40% of an orogastric dose of *d*-[^{14}C]xylose as $^{14}CO_2$ over 6 hr, as compared with 9% in nonoperated control rats and 17% in surgical controls with self-emptying blind loops. $^{14}CO_2$ production decreased significantly with neomycin treatment of rats with self-filling blind loops ($p<0.025$) and was correlated with a significant decrease of gram-negative coliforms in jejunal contents. Small intestinal bacteria were implicated in the production of up to 76% of the $^{14}CO_2$ production by blind loop rats, with colon bacterial catabolism of unabsorbed xylose a smaller additive factor. The i.v. administration of *d*-[^{14}C]xylose demonstrated that $^{14}CO_2$ production by cellular metabolism of xylose was an insignificant part of the breath $^{14}CO_2$ output. Urinary xylose excretion was significantly decreased ($p<0.001$) in rats with self-filling blind loops by an amount correlating with the demonstrated intraluminal bacterial catabolism of xylose. Thus, intraluminal catabolism of

xylose by small intestine bacteria appears to be the major determinant of the decreased urinary xylose excretion of the experimental blind loop syndrome, with colon bacterial catabolism of malabsorbed xylose a probable minor additional factor.

5263 SMALL INTESTINAL EPITHELIAL CELL KINETICS AND PROTOZOAL INFECTION IN MICE. (Eng.) MacDonald, T. T.; Ferguson, A. (Dept. Bacteriology, Univ. Glasgow, Glasgow, Scotland). *Gastroenterology* 74(3):496-500; 1978.

The effects of chronic protozoal infection on small intestinal architecture and epithelial cell kinetics, and the relationships between such infection, intraepithelial (IE) lymphocyte counts, and changes in epithelial cell kinetics were examined in mice infected with *Giardia muris* and *Hexamita muris*. The techniques used were conventional histology, quantitation of IE lymphocytes, microdissection and measurement of individual villi and crypts, and epithelial cell kinetic studies. The histology of small intestine from infected mice appeared normal, apart from the IE lymphocyte numbers. The mean lymphocyte counts in two groups of uninfected mice were 11.6 and 13.6/100 epithelial cells, and in two groups of infected mice were 17.6 and 21.8/100 cells. Dynamic studies showed that protozoal infection doubled the cell production from mean values of 6.2, 7.3, and 8.2/crypt/hr in three groups of uninfected animals to 11.8, 13.4, and 17.1/crypt/hr in groups of chronically infected mice. Cell production per villus was also influenced by protozoal infection, with values of 93, 99, and 101 cells/hr in groups of uninfected animals and 155, 162, and 180 cells/hr in infected mice. Although there was no reduction in villus height in the infected animals, radioautography using ^{3}H-thymidine confirmed that the enterocytes moved more rapidly up the sides of the villi than was the case for uninfected mice. The authors conclude that there is some impairment of the immune response to the parasites when mice are infected with *Giardia* and *Hexamita* from the neonatal period, as they were in this model.

5264 EFFECTS OF ILEAL AND CAECAL RESECTION ON THE COLON OF THE RAT. (Eng.) Scarpello, J. H. B.; Cary, B. A.; Sladen, G. E. (Royal Hosp., Sheffield, England). *Clin. Sci. Mol. Med.* 54(3): 241-249; 1978.

To investigate the role of the colon in the watery diarrhea commonly associated with distal ileal resection, the effects of this procedure on colonic secretion were investigated in rats. Rats were subjected to resection of either the distal 50 cm of small bowel, cecum, or a combined ileocecal operation. The effects on stool production and growth were observed over the following 8 weeks. Rapid adaptation, in terms of growth and the production of formed stools, was seen after ileectomy or cecectomy. This adaptation was slower and less complete after ileocecectomy. Changes in water content indicated that colonic water absorption was normal after ileectomy but impaired after ileocecectomy. After ileectomy, there was growth of the cecum but not of the colon, whereas after ileocecectomy, there was growth of the remaining colon. The intraluminal bile acid concentration in the small gut remnant was markedly decreased at 2 weeks with little change at 8 weeks after ileal resection. The colonic intraluminal bile acid concentration was only modestly increased after ileectomy or ileocecectomy. When studied by a perfusion technique *in vivo*, deoxycholate (2.5 mM) in intact rats induced a net secretion of water into the colon. In contrast, the colon of 8 week ileectomized rats absorbed water, although this was at a reduced rate compared with control rats. Deoxycholate increased mucosal cyclic AMP concentrations in the intact rats but not in the ileectomized rats. Sodium ricinoleate (5.0 mM) inhibited colonic water absorption, and when mixed with deoxycholate (2.5 mM), the effect on water transport was summatory. However, ricinoleate either alone or with deoxycholate did not alter mucosal cyclic AMP concentrations. These results demonstrate that the colon can absorb water effectively after ileectomy in spite of being exposed to increased concentrations of luminal bile acids. This ability may result in part from an altered mucosal response to secretagogues. If so, it represents a form of functional adaptation by the colon to ileal resection.

5265 BILE ACID AND FATTY ACID EFFECT ON INTESTINAL CYCLIC-AMP, $Na^{+}K^{+}$ ATPase AND SECRETION [Abstract]. (Eng.) Feinstein, J. D.; Coyne, M. J.; Bonorris, G. G.; Chung, A.; Schoenfield, L. J. (Cedars-Sinai Medical Center, Los Angeles, CA). *Gastroenterology* 72(5, Part 2):1183; 1977.

5266 ISOLATION AND PURIFICATION OF LITHOCHOLIC ACID METABOLITES PRODUCED BY THE INTESTINAL MICROFLORA. (Eng.) Kelsey, M. I.; Sexton, S. A. (Natl. Cancer Inst. Frederick Cancer Res. Center, P.O. Box B, Frederick, MD 21701). *J. Chromatogr.* 133(2):327-334; 1977.

5267 EVIDENCE AGAINST IMPORTANCE OF ALTERED MUCOSAL PERMEABILITY IN RICINOLEIC ACID INDUCED FLUID SECRETION [Abstract]. (Eng.) Binder, H. J.; Dobbins, J. W.; Whiting, D. S. (Yale Univ., New Haven, CT). *Gastroenterology* 72(5, Part 2): 1029; 1977.

5268 CYTOPROTECTIVE EFFECT OF ASPIRIN AND AMINOPYRINE [Abstract]. (Eng.) Robert, A.; Hanchar, A. J.; Lancaster, C.; Nezamis, J. E. (Dept. Experimental Biology, Upjohn Co., Kalamazoo, MI). *Gastroenterology* 72(5, Part 2):1120; 1977.

5269 INTESTINAL SECRETION INDUCED BY THE LAXATIVE BISACODYL [Abstract]. (Eng.) Ewe, K.; Przybylski, P.; Hachgenei, A.; Wanitschke, R. (I. Medical Dept., Johannes Gutenberg-Univ. Mainz, Mainz, W. Germany). *Gastroenterology* 72 (5, Part 2):1056; 1977.

5270 DISTRIBUTION OF CHOLECYSTOKININ ACTIVITY IN THE RAT SMALL INTESTINE. (Eng.) Schneeman, B. O.; Lyman, R. L. (Children's Hosp. Medical Center, 51st and Grove St., Oakland, CA 94609). *Digestion* 15(1):28-33; 1977.

5271 COLCHICINE INHIBITS CYCLIC AMP-MEDIATED INTESTINAL SECRETION [Abstract]. (Eng.) Notis, W. M.; Field, M.; Glickman, R. M. (Beth Israel Hosp., Boston, MA). *Gastroenterology* 72(5, Part 2):1108; 1977.

5272 HUMAN ENTEROKINASE (EK)--CHARACTERIZATION, SUBCELLULAR LOCALIZATION AND DEVELOPMENT [Abstract]. (Eng.) Lebenthal, E. (Harvard Medical Sch., Boston, MA). *Gastroenterology* 72(5, Part 2):1087; 1977.

5273 FOLATE BINDING PROTEIN IN THE SMALL INTESTINE: ISOLATION AND PARTIAL CHARACTERIZATION [Abstract]. (Eng.) Das, B. C.; Shaw, S. A. (Veterans Admin. Hosp., Charleston, SC). *Gastroenterology* 72(5, Part 2):1043; 1977.

5274 HUMAN JEJUNAL BRUSH BORDER FOLATE CONJUGASE [Abstract]. (Eng.) Reisenauer, A. M.; Krumdieck, C. L.; Halsted, C. H. (Dept. Internal Medicine, Univ. California, Davis, CA 95616). *Gastroenterology* 72(5, Part 2):1118; 1977.

5275 REGULATION OF LECITHIN SYNTHESIS IN INTESTINE [Abstract]. (Eng.) Mansbach, C. M., II (Veterans Admin. Hosp., Durham, NC). *Gastroenterology* 72(5, Part 2):1098; 1977.

5276 COLONIC CHANGES PRODUCED BY TRANSFERRING COLON SENSITIZED LYMPHOCYTES INTO NORMAL GUINEA PIGS [Abstract]. (Eng.) Rogers, S. J.; Rabin, B. S. (Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA 15261). *Gastroenterology* 72(5, Part 2): 1121; 1977.

5277 FLOW RATE AND COMPOSITION OF INTESTINAL LYMPH IN CONSCIOUS RATS AFTER INTRADUODENAL APPLICATION OF WATER [Abstract]. (Eng.) Gartemann, H.; Dennhardt, R.; Reschke, W.; Haberich, F. J. (Inst. fur Angewandte Physiologie, 3550 Marburg/Lahn, Lahnberge, W. Germany). *Pfluegers Arch.* 368(Suppl.):R11; 1977.

5278 THE SMALL INTESTINE IN LEUKEMIC MICE AND THE EFFECT OF METHOTREXATE [Abstract]. (Eng.) Branski, D.; Lebenthal, E.; Hatch, T. F.; Krasner, J.; Fisher, J. E.; Freeman, A. I. (State Univ. New York, Buffalo, NY). *Gastroenterology* 72(5, Part 2):1169; 1977.

5279 EFFECT OF PENTAGASTRIN ON THE SMALL INTESTINE AFTER RESECTION [Abstract]. (Eng.) Morin, C. L.; Ling, V.; Bourassa, D. (Hopital Ste-Justine, Montreal, Canada). *Gastroenterology* 72(5, Part 2):1105; 1977.

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5294 EFFECT OF INTRALUMINAL LIPID ON SMALL BOWEL ADAPTATION AFTER RESECTION [Abstract]. (Eng.) Morin, C. L.; Ling, V.; Bourassa, D. (Hopital Sainte-Justine, Montreal, Quebec, Canada). *Clin. Res.* 25(5):688A; 1977.

See also, 5072, 5073, 5080, 5085, 5089, 5091, 5094, 5099, 5118, 5128, 5151, 5162, 5224, 5239, 5296, 5299, 5301, 5321, 5323, 5326, 5481, 5509, 5560, 5583, 5779.

GENERAL

5295 HEMORRHAGIC NECROSIS OF THE INTESTINAL MUCOSA ASSOCIATED WITH DISSEMINATED INTRAVASCULAR COAGULATION. (Eng.) Kondo, M.; Yoshikawa, T.; Takemura, S.; Yokoe, N.; Kawai, K.; Masuda, M. (Kyoto Prefectural Univ. Medicine, Kawaramachi-Hirokoji, Kamikyo-ku, Kyoto 602, Japan). *Digestion* 17(1):38-45; 1978.

To study the pathogenesis of intestinal hemorrhagic necrosis that is associated with disseminated intravascular coagulation (DIC), DIC was experimentally induced by the i.v. injection of *Escherichia coli* endotoxin (6-15 mg/kg) in dogs. This injection caused severe hemorrhagic necrosis of the intestinal mucosa. Microscopy showed tortuous thrombus formation in the microcirculation of the villi. Ligation of the pancreatic and bile ducts protected only the duodenum from hemorrhagic necrosis, while local pretreatment of the intestinal mucosa by Trasylol (25,000 U) or tranexamic acid (10% solution) reduced the degree of hemorrhagic necrosis. Among five rats that received tranexamic acid (400 mg/kg, i.p., plus 1% in the drinking water) followed by endotoxin (5 mg/kg, i.v.), hemorrhagic necrosis of the small intestine was observed in four, compared to only one of five rats in the saline-treated control group. When five rats receiving endotoxin (20 mg/kg, i.v.) alone were compared with five rats receiving both endotoxin and heparin (1,000 U/kg, i.v.), the heparin-treated group was seen to have less hemorrhagic necrosis than the other group, indicating the substantial role of DIC in this intestinal lesion. It is concluded that intravascular coagulation in the microcirculation of the intestinal mucosa, as well as pancreatic proteases, play a role in the pathogenesis of hemorrhagic necrosis in the intestine associated with DIC.

5296 LOCAL (IMMUNOGLOBULIN A) IMMUNE RESPONSE BY THE INTESTINE TO CHOLERA TOXIN AND ITS PARTIAL SUPPRESSION WITH COMBINED SYSTEMIC AND INTRAINTESTINAL IMMUNIZATION. (Eng.) Yardley, J. H.; Keren, D. F.; Hamilton, S. R.; Brown, G. D. (Walter Reed Army Inst. Res., Washington, DC 20012). *Infect. Immun.* 19(2):589-597; 1978.

The local and systemic immune response to purified cholera toxin (CT) were studied in chronically isolated Thiry-Vella (T-V) ileal loops in rabbits. Immunization consisted of intraloop (i.l.), s.c., or combined i.l. and s.c. inoculation of CT. Fluid from the loops and sera were tested for neutralization of CT by the blueing test and for relative content of isotype-specific (IgA and IgG) anti-CT. To demonstrate protection against CT, fluid production by the chronic T-V loops was measured after challenge with CT; an "acute" loop prepared from adjacent intestine at the time of challenge was also tested in some animals. The highest neutralizing titers in loop fluids were found in animals

receiving i.l. or i.l. and s.c. inoculations, whereas titers in sera were highest in rabbits receiving s.c. or i.l. and s.c. inoculations. IgA anti-CT in fluids became greatest after i.l. inoculation alone and was lowest in s.c. animals. Combined s.c. and i.l. immunization was accompanied by reduced content of IgA anti-CT in fluids as compared with that obtained with i.l. inoculation alone. This finding strongly suggests a suppressive effect on local immunization by s.c. inoculation. While this suppression may have been due to a direct (toxigenic) effect of CT on lymphocytes, an immunogenic mechanism, probably mediated through suppressor T cells, is favored. Little IgG anti-CT was detected in any loop fluids, but high levels were found in sera after two s.c. inoculations or four i.l. inoculations. Neutralization titers for the fluid specimens showed much better correlation with IgA anti-CT values than with IgG anti-CT values. The chronic and acute T-V loops showed protection against fluid production after exposure to CT in systemically and locally immunized animals. However, IgG anti-CT usually appeared in both loops; leakage of serum antibodies because of surgical manipulation was felt, therefore, to invalidate these protection results as a demonstration of local immunity. In challenge studies in undisturbed chronic loops, only local immunization alone was found to result in definite protection. These data do not permit a clear choice between a toxigenic or an immunogenic mechanism for suppression of IgA anti-CT in loops, but the immunogenic mechanism is favored. Additionally, it is possible that suppression of local immunity (and hence suboptimal protection) may occur when combined parenteral and p.o. vaccination are used in humans.

5297 INVAGINATED ESOPHAGOGASTRIC ANASTOMOSIS IN RESECTION OF THE CARDIA: AN EXPERIMENTAL STUDY. (Rus.) Morkhov, Iu. K.; Narodnitskaia, N. A.; Rottenberg, V. I. (Inst. Experimental and Clinical Oncology, USSR Acad. Medical Sciences, Moscow, USSR). *Grudn. Khir.* (4):78-82; 1977.

5298 TOTAL ESOPHAGEAL GRAFT USING JEJUNAL LOOP AND VASCULAR MICROANASTOMOSIS AT THE NECK: AN EXPERIMENTAL STUDY. (Fre.) Germain, M.; Patricio, J.; Gremillet, C.; Delavierre, Ph.; Dehoux, Ph.; Voudron, J.; Loisance, D. Y. (Hopital de Vaugirard, C.H.U. Necker, Enfants Malades, 389, rue de Vaugirard, 75015 Paris, France). *Chirurgie* 103(4):264-267; 1977.

5299 EVOLUTION OF INTESTINAL AND SERUM IMMUNOGLOBULINS OF THE MOUSE FOLLOWING ORAL VACCINATION. (Fre.) Ivanoff, B.; Laval, F.; Creach, O.; Fontanges, R. (Centre de Recherche, Service de Sante des Armees, 108, boulevard Pinel, 69272 Lyon Cedex 1, France). *C. R. Soc. Biol. (Paris)* 171 (2):380-385; 1977.

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5303 INFLUENCE OF ORALLY ADMINISTERED PANCREATIC EXTRACT ON Vibrio cholerae INFECTION DURING PROTEIN-FREE DIET. (Ger.) Gyr, K.; Felsenfeld, O. (Kantonsspital, CH-4004 Basel, Switzerland). *Schweiz. Med. Wochenschr.* 107(15):545-546; 1977.

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5311 CHANGES OF WAKEFULNESS IN THE RAT WITH PORTOCAVAL SHUNT: A QUANTITATIVE EVALUATION OF EXPERIMENTAL HEPATIC ENCEPHALOPATHY [Abstract]. (Eng.) Beaubernard, C.; Salomon, F.; Grange, D.; Bismuth, H. (Groupe Hospitalier Paul Brousse, 14, Avenue P.-V. Couturier, 94800 Villejuif, France). *Eur. Surg. Res.* 9(Suppl. 1):164; 1977.

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5316 EFFECT OF PREGNANCY ON THE NUMBER OF WORMS DEVELOPED IN MICE INFECTED WITH Schistosoma mansoni. (Eng.) Preston, A. M.; El-Khatib, S. M. (Univ. Puerto Rico Medical Sciences Campus, G.P.O. Box 5067, San Juan, PR 00936). *J. Parasitol.* 63(5):943-945; 1977.

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5319 TIME-DEPENDENT GASTROINTESTINAL ADAPTATION OF HUMAN SUBJECTS AND NONHUMAN PRIMATES TO LIQUID DEFINED FORMULA DIETS. (Eng.) Spiller, G. A.; Beigler, M. A. (Inst. Agriscience and Nutrition, Syntex Res., Palo Alto, CA 94304). *Z. Ernaehrungswiss.* 20(Suppl.):48-57; 1977.

5320 THE EFFECT OF ACUTE AND SUBACUTE AMMONIA INTOXICATION ON REGIONAL CEREBRAL ACETYLCHOLINE LEVELS IN RATS [Abstract]. (Eng.) Parker, T. H.; Roberts, R. K.; Vorhees, C. V.; Schmidt, D. E.; Schenker, S. (Vanderbilt Univ. Sch. Medicine, Nashville, TN). *Gastroenterology* 73(5):1238; 1977.

5321 CHOLESTEROL LOWERING MECHANISM DUE TO INTESTINAL BYPASS IN RAT [Abstract]. (Eng.) David, J. S. K.; Reichle, F. A.; Golsorkhi, M. (Temple Univ. Health Sciences Center, Philadelphia, PA 19140). *Gastroenterology* 73(5):1242; 1977.

5322 BILIRUBIN ISOMERS AND PHOTOTHERAPY [Abstract]. (Eng.) Roos, W. T.; Wieger, H. H.; Windler, S. C. H.; Jones, C. O. (Dept. Pediatric Oncology, Univ. California, San Francisco, CA 94143). *Gastroenterology* 73(5):1243; 1977.

5323 TROPHIC AND CO-CARCINOGENIC ACTIONS OF PANCREATICOBILIARY SECRETIONS [Abstract]. (Eng.) Williamson, R. C. N.; Bauer, F. L. R.; Ross, J. S.; Malt, R. A. (Dept. Surgery, Univ. Bristol, Bristol, England). *Ir. J. Med. Sci.* 146(Suppl. 1):8; 1977.

5324 IMMUNOTHERAPY OF CHEMICALLY INDUCED RAT COLORECTAL CARCINOMA [Abstract]. (Eng.) Martin, M. S.; Martin, F. (Laboratoire d'Immunologie, CNRS ERA 628, Dijon, France). *Digestion* 16(1/2):214-215; 1977.

5325 CERVICAL ESOPHAGOSTOMY IN DOGS: ENDOSCOPIC, RADIOGRAPHIC, AND HISTOPATHOLOGIC EVALUATION OF ESOPHAGITIS INDUCED BY FEEDING TUBES.

(Eng.) Balkany, T. J.; Baker, B. B.; Bloustein, P. A.; Jafek, B. W. (Univ. Colorado Medical Center, Denver, CO 80220). *Ann. Otol. Rhinol. Laryngol.* 86(5, Part 1):588-593; 1977.

5326 HYPOXIC PROTECTION OF CANINE JEJUNUM FROM RADIATION INJURY. (Eng.) Peterson, C. E.; Eddy, H. A.; Patterson, W. B. (Univ. Rochester Sch. Medicine and Dentistry, Rochester, NY). *Surg. Forum* 28:426-428; 1977.

See also, 5071, 5133, 5144, 5228, 5276, 5514, 5668, 5784, 5798.

DIAGNOSTIC PROCEDURES

5327 SIGNIFICANCE OF SERUM LEVEL OF 25-HYDROXYCHOLECALCIFEROL IN GASTROINTESTINAL DISEASE. (Eng.) Schoen, M. S.; Lindenbaum, J.; Roginsky, M. S.; Holt, P. R. (Coll. Physicians and Surgeons, Columbia Univ., New York, NY). *Am. J. Dig. Dis.* 23(2):137-142; 1978.

The serum 25-hydroxycholecalciferol (25-OHCC) concentration was measured in 19 patients with steatorrhea, 37 with malabsorption, 3 with cholestasis, 13 with cirrhosis, 12 patients who had undergone jejunoileal bypass, 29 postgastrectomy patients, 19 patients with functional bowel disease, and 19 healthy controls to evaluate the usefulness of this determination in the management of gastrointestinal disorders. Patients with functional bowel disease had lower serum mean 25-OHCC levels than did the normal subjects. The results were divided into normal (>21 ng/ml), low normal (12-21 ng/ml), and low levels (<12 ng/ml). Two-thirds of the patients with malabsorption had low serum 25-OHCC. Most patients following jejunoileal bypass surgery for morbid obesity had low levels, despite supplemental p.o. calciferol therapy; only 4 of the 12 had levels over 12 ng/ml. In patients with chronic liver disease, cholestasis more than parenchymal cell disease appeared responsible for low serum 25-OHCC levels; the levels were depressed in all three patients with cholestasis but in only 2 of the 13 with cirrhosis. Measurement of serum 25-OHCC may be an ancillary screening test for fat malabsorption and in patients with intraluminal bile salt deficiency. Furthermore, repeated measurements may be useful in monitoring therapy with vitamin D products in patients with chronic malabsorption and cholestasis.

5328 DOUBLE-BLIND RADIOGRAPHIC STUDY OF DOSE RESPONSE TO INTRAVENOUS GLUCAGON FOR HYPOTONIC DUODENOGRAPHY. (Eng.) Miller, R. E.; Chernish, S. M.; Brunelle, R. L.; Rosenak, B. D. (Indiana Sch. Medicine, Indianapolis, IN 46202). *Radiology* 127(1):55-59; 1978.

A study was carried out in 15 normal volunteers to determine whether small doses of glucagon given i.v. would induce sufficient hypotonicity of the upper gastrointestinal tract to provide a reliable demonstration of gut anatomy during radiographic studies. The subjects received placebo and 0.25 mg, 0.5 mg, 1 mg, and 2 mg of glucagon i.v., double-blind, and crossover. The onset of drug effect occurred in approximately 45 sec, regardless of the dose of glucagon given. There was a significant ($p<0.01$) decrease in gastrointestinal tonicity with all doses. The larger the dose, the greater the duration of drug action. Satisfactory stomach, duodenal, and small bowel hypotonicity for radiography are obtained with few side-effects with 0.25 to 0.5 mg of glucagon given i.v.

5329 AN IN-VITRO IMMUNOLOGICAL ASSAY FOR DIAGNOSIS OF COELIAC DISEASE. (Eng.) Ashkenazi, A.; Handzel, Z. T.; Idar, D.; Ofarim, M.; Levin, S. (Kaplan Hosp., P.O. Box 1 Rehovot, Israel). *Lancet* 1(8063):627-629; 1978.

Production of leukocyte-migration-inhibition factor (LIF) by peripheral blood lymphocytes in response to challenge with gluten fractions was studied as a diagnostic test for celiac disease in 55 patients with celiac disease and in 32 controls. Ninety-six percent of the patients with celiac disease demonstrated significant LIF reaction in response to gluten fractions irrespective of their dietary status. Only two controls had a positive reaction. This was in response to the B2 or B3 fraction, but never to both. The agarose microdroplet method of LIF assay is reliable and technically simple enough for use in most clinical laboratories. The assay of LIF production by peripheral blood lymphocytes in response to gluten fractions would be a useful adjunct in the diagnosis of gluten-sensitive enteropathy.

5330 COMPUTED TOMOGRAPHY IN PANCREATIC DISEASE. (Eng.) Fawcitt, R. A.; Forbes, W. S. C.; Isherwood, I.; Braganza, J. M.; Howat, H. T. (Dept. Diagnostic Radiology, Univ. Manchester, Manchester, England). *Br. J. Radiol.* 51(601):1-4; 1978.

As a prerequisite to a future study of computed tomography (CT) in the management of pancreatic disease, CT of the pancreas was evaluated in 50 patients with established exocrine pancreatic disease and 20 patients without pancreatic disease. Increase in size, irregularity in outline, and heterogeneity of composition of the pancreas implied disease but were in no way specific to any particular disease entity. In acute pancreatitis, following complete resolution, the pancreas appeared normal, whereas incomplete resolution was associated with nonspecific swelling and heterogeneity of density. The extent and location of pseudocysts could be accurately delineated. In chronic pancreatitis, duct calculi, duct dilatation, and large intrapancreatic cysts aided the differentiation between focal enlargement due to chronic pancreatitis and expansion due to cancer. Hepatic metastases and abnormalities of the biliary system seen in association with cancer further aided this differentiation.

5331 AN EVALUATION OF ANGIOGRAPHY, ^{75}Se-METHIONINE SCINTIGRAPHY AND THE LUNDH TEST IN THE DIAGNOSIS OF PANCREATIC DISEASE. (Eng.) Kugelberg, C.; Ihse, I.; Cederquist, E.; Larsson, I.; Tylen, U. (Dept. Surgery, Univ. Lund, Lund, Sweden). *Acta Chir. Scand.* 143(6):353-358; 1977.

To determine the most satisfactory procedure for clinical use in the diagnosis of pancreatic disease, 74 patients subjected to selective angiography, pancreatic function test (Lundh test), and scintigraphy were studied retrospectively. The patients were divided into four diagnostic subgroups, three of which represented defined pancreatic disease, the fourth serving as a control group, since such disease was excluded. The primary diagnostic results were compared. After a stipulated minimum of 6 months, the angiographic films and scintigraphic recordings were reap-

praised in a randomized manner without access to clinical data. The evaluations thus achieved were compared to those delivered primarily. The Lundh test and pancreatic scintigraphy were found to have a high level of diagnostic reliability and consistency; when normal, they practically ruled out pancreatic disease. Angiography was useful only if one or both of the above mentioned screening methods yielded pathologic results, supported by clinical evidence. The principal aims of selective angiography in suspected pancreatic disease are to map vascular anatomy, to differentiate non-neoplastic disease from cancer, and to assist estimation of operability. The results indicate that the diagnostic accuracy of angiography, more than that of scintigraphy, is dependent on the experience of the examiner.

5332 PLASMA CYCLIC AMP LEVELS DURING A SECRETIN-CAERULEIN PANCREATIC FUNCTION TEST IN LIVER AND PANCREATIC DISEASE. (Eng.) Adler, M.; Robberecht, P.; Poitevin, M. G.; Christophe, J. (Free Univ. Brussels Medical Sch., Boulevard de Waterloo 115, B-1000 Brussels, Belgium). *Gut* 19(3): 214-219; 1978.

The initial purpose of this study was to explore the possible usefulness of plasma cyclic AMP (cAMP) determinations during secretin and cerulein infusions as a further pancreas function test. It became evident, however, that the data obtained were more useful in evaluating hepatic rather than pancreatic impairments. Plasma cAMP levels were determined during a 40-min secretin infusion (1 clinical [C] U/kg/hr) followed by a 40-min combined secretin (1 CU/kg/hr)-cerulein (75 ng/kg/hr) infusion. In nine healthy subjects, both secretin alone and secretin in combination with cerulein did not affect plasma cAMP levels. The same result was observed in six patients with chronic pancreatitis. By contrast, in patients with liver disease (9 cases) or extrahepatic cholestasis (6 cases), secretin elicited large increases in plasma cAMP concentration; the mean values were seven and four times higher than before the infusion, resp. On the other hand, increases in plasma cAMP 10 min after a bolus injection of glucagon (1 mg) were four times lower in the liver disease group as compared to the controls. The results suggest that the liver plays a major role in the degradation of plasma cAMP produced by target tissues responding to secretin and in the release of cAMP under the influence of glucagon. Liver disease reduces the capacity of the liver to clear cAMP from the blood. The pancreas does not contribute significantly to the level of cAMP in the blood.

5333 ALPHA-FETOPROTEIN IN LIVER DISEASE. (Eng.) Alexander, M. G.; Purves, L. R.; Kirsch, R. E.; Bass, N. M.; Gitlin, N.; Terblanche, J.; *et al.* (Groote Schuur Hosp., Cape Town, South Africa). *S. Afr. Med. J.* 53(12):433-436; 1978.

The serum concentration of alpha-fetoprotein (AFP) was measured by radioimmunoassay in 98 patients with liver diseases including hepatoma (35), chronic active hepatitis (12), alcoholic cirrhosis (43), and acute virus B hepatitis (8). Raised AFP levels (>30 ng/ml) were found in 87% of patients with acute viral hepatitis, in 82% of patients with primary liver cell carcinoma, in 58% with chronic active hepatitis, and in 14% of patients with alcoholic cirrhosis. However, levels above 1,000 ng/ml were found only in patients with hepatoma and in acute viral hepatitis. The results suggest that AFP synthesis may occur as a result of regenerative activity.

5334 CLINICAL VALUE OF THE BILE ACID BREATH TEST: EVALUATION OF THE MAYO CLINIC EXPERIENCE. (Eng.) Lauterburg, B. H.; Newcomer, A. D.; Hofmann, A. F. (Div. Gastroenterology, Univ. California at San Diego, San Diego, CA). *Mayo Clin. Proc.* 53(4):227-233; 1978.

To assess the clinical value of the bile acid breath test, experience with 228 tests in 219 patients was analyzed retrospectively. In patients with suspected bacterial overgrowth, the result of the bile acid breath test was compared with that of small bowel aspirate cultures, and the test was found to have a sensitivity of 0.70 and a specificity of 0.90 (1.0 was highest possible value). The bile acid breath test failed to demonstrate the presence of bacterial overgrowth in one-third of the patients with a positive small bowel culture. Analysis of the data showed that, compared with a routine evaluation without a small bowel culture, the availability of breath test results will double the probability with which the clinician can be certain about the presence or absence of bacterial overgrowth. The test result appeared to influence the diagnosis in 83% and the management in 74% of the 163 patients in whom it was performed because of suspected bacterial overgrowth. In patients with suspected malabsorption of bile acids, on the other hand, the test that was performed without determination of fecal bile acid excretion appeared to be rather insensitive, and only rarely was information gained that was not already known from a routine workup of the patient.

5335 ASSESSMENT OF THE (^{14}C) AMINOPYRINE BREATH TEST IN LIVER DISEASE. (Eng.) Galizzi, J.; Long, R. G.; Billing, B. H.; Sherlock, S. (Faculdade de Medicina, Belo Horizonte, M.G., Brazil). *Gut* 19(1):40-45; 1978.

Different methods of performing the ^{14}C-aminopyrine breath test were assessed in 27 patients with chronic active hepatitis (with and without cirrhosis), 21 with primary biliary cirrhosis, 11 with alcoholic cirrhosis, 7 with alcoholic hepatitis, 8 with alcoholic fatty liver, 3 with acute hepatitis, 4 with hepatic malignancy, 3 with neoplastic bile duct obstruction, 3 with extrahepatic bile duct obstruction, and 15 controls. A tracer dose of 2 μCi without a loading dose and with a single breath collection at 2 hr was the method selected, since it gave the best discrimination between pa-

tients with hepatocellular diseases and normal subjects (5.2 ± 0.2%). Reduced values occurred in patients with chronic active hepatitis (1.5 ± 0.2%, $p<0.001$), alcoholic cirrhosis (1.7 ± 0.4%, $p<0.001$), hepatitis (2.5 ± 0.3%), and late primary biliary cirrhosis, suggesting defective microsomal function with respect to demethylation. Normal results were common in early primary biliary cirrhosis. Two weeks of prednisolone therapy caused some improvement in the breath test in 9 of 10 patients with chronic active hepatitis. It is concluded that the ^{14}C-aminopyrine breath test is a simple test for detecting hepatocellular dysfunction, but has no obvious diagnostic advantage over the determination of serum aspartate transaminase and 2 hr postprandial bile acids.

5336 LIPOPROTEIN-X AND DIAGNOSIS OF CHOLESTASIS: COMPARISON WITH OTHER BIOCHEMICAL PARAMETERS AND LIVER BIOPSY. (Eng.) Fellin, R.; Manzato, E.; Zotti, S.; Baggio, G.; Briani, G.; Rugge, M. (Univ. Hosp., Via Guistiniani 2, 35100 Padova, Italy). *Clin. Chim. Acta* 85(1):41-47; 1978.

To study the comparative diagnostic value of the lipoprotein X (LP-X) test in liver disease, the presence or absence of histological signs of cholestasis was compared with the levels of total bilirubin, alkaline phosphatase, gamma-glutamyl transpeptidase (γ-GT), ornithine carbamoyltransferase, and SGOT, and the LP-X test in 157 patients with different liver diseases. The LP-X test was positive in 93% of the 59 patients in whom histological evidence of cholestasis was observed and negative in 95% of the 98 patients in whom histological examination was negative. The LP-X test concurred more frequently with the histological picture than did total bilirubin (>1 mg/dl in 88%) or alkaline phosphatase (>4.1 IU/l in 71%) activities. An increment in γ-GT levels was observed in 97% of the patients with a positive LP-X test. These data confirm that the LP-X test is more specific than the tests traditionally used to demonstrate or exclude cholestasis.

5337 VITAMIN B_6 AND ASPARTATE AMINOTRANSFERASE ACTIVITY IN CHRONIC LIVER DISEASE. (Eng.) Rossouw, J. E.; Labadarios, D.; Davis, M.; Williams, R. (MRC Natl. Res. Inst. for Nutritional Diseases, Parowvallei, CP, South Africa). *S. Afr. Med. J.* 53 (12):436-438; 1978.

The effect of vitamin B_6 supplementation on serum aspartate aminotransferase (AST) activity was studied in patients with decompensated liver disease. Treatment of eight vitamin B_6-deficient cirrhotic patients with pyridoxine hydrochloride (50 mg i.v., b.i.d. for 1 week) increased their serum AST concentrations from 121 ± 18 to 136 ± 26 IU/l, while treatment of a second group of nine patients with the active coenzyme pyridoxal-5-phosphate (PLP) increased AST concentrations from 118 ± 17 to 146 ± 20 IU/l. Neither of these increases was statistically significant. Plasma PLP increased from 2.4 ± 0.7 to 18.5 ± 7.6 ng/ml after pyridoxine, and from 3.3 ± 0.7 to 27.0 ± 6.2 ng/ml after PLP supplementation. It is concluded that B_6 deficiency is unlikely to be an important determinant of serum AST concentrations in patients with chronic liver disease.

5338 COMPLICATIONS OF DIAGNOSTIC PARACENTESIS IN PATIENTS WITH LIVER DISEASE. (Eng.) Mallory, A.; Schaefer, J. W. (Denver General Hosp., W. Eighth Ave. and Cherokee St., Denver, CO 80204). *JAMA* 239(7):628-630; 1978.

Experience with diagnostic abdominal paracentesis in 242 patients with liver disease or ascites is reviewed to determine its safety. There were seven major complications, including serious hemorrhage (4), perforation of bowel with generalized peritonitis (1), perforation of bowel with abdominal wall abscess (1), and a catheter fragment left in the abdominal wall or cavity (1). The results emphasize the potential dangers of this procedure in these patients and raise the possibility that complications may be more common than previously thought.

5339 IOGLYCAMIDE (BILIGRAM) STUDIES IN MAN--RELATION BETWEEN PLASMA CONCENTRATION AND BILIARY EXCRETION. (Eng.) Bell, G. D.; Fayadh, M.; Frank, J.; McMullin, J.; Fry, I. K. (St. Bartholomew's Hosp., London, E.C.1, England). *Br. J. Radiol.* 51(602):111-115; 1978.

In view of the hazards associated with i.v. cholangiography, the lowest infusion rate of ioglycamide necessary to achieve optimal radiographic opacification of the bile duct was studied in 36 patients. Plasma ioglycamide concentration was linearly related to the rate of i.v. infusion over a dose range of 1 to 4 mg/kg/min. The relation between plasma and biliary concentration of ioglycamide was studied in 15 anicteric patients with a T-tube *in situ*. Peak biliary concentrations and excretory rates of ioglycamide were seen when the plasma concentration was greater than 1,500 µg/ml. The mean biliary transport maximum for ioglycamide in man was 31.6 mg/min (range 22.0-40.4). The results suggest that near optimal concentrations of iodine in the bile duct can be obtained during i.v. cholangiography if ioglycamide is infused for 1 hr at a rate of about 4 mg/kg/min.

5340 THE EARLY USE OF FINE-NEEDLE PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY IN AN APPROACH TO THE DIAGNOSIS OF JAUNDICE IN A SURGICAL UNIT. (Eng.) Benjamin, I. S.; Allison, M. E. M.; Moule, B.; Blumgart, L. H. (Glasgow Royal Infirmary, Glasgow, Scotland). *Br. J. Surg.* 65(2):92-98; 1978.

The value and safety of fine-needle percutaneous transhepatic cholangiography (PTC) were investigated in 46 patients with jaundice or suspected biliary tract disease. The ductal system was successfully outlined in each of 20 patients with dilated intrahepatic ducts and in 19 of 26 patients with intra-

hepatic ducts of normal caliber. There were two episodes of septicemia after PTC, one of them fatal. Valuable accurate diagnostic information was obtained in all cases with biliary tract obstruction. Fine-needle PTC is an acceptably safe procedure and need not be followed by immediate laparotomy.

5341 EVALUATION OF ULTRASOUND IN THE DIAGNOSIS OF ACUTE AND CHRONIC BILIARY TRACT DISEASE. (Eng.) Thal, E. R.; Weigelt, J.; Landay, M.; Conrad, M. (Southwestern Medical Sch., 5323 Harry Hines Blvd., Dallas, TX 75235). *Arch. Surg.* 113(4):500-503; 1978.

The reliability of B-scale sonography was evaluated in 108 patients who underwent the procedure prior to operation. The sonogram was correct in 96 of the 108 patients. There were four false-negatives, one false-positive, and seven patients in whom the study was nondiagnostic. Stones were seen in 88 patients and confirmed in 87 patients, for an accuracy of 98.9%. Sonography is a simple, noninvasive procedure by which cholelithiasis can be accurately detected. Because of the high correlation between sonography and operative findings, the authors suggest that cholecystosonography be used as the initial screening study in patients suspected of having biliary tract disease.

5342 NEW CHOLANGIOGRAPHIC SIGN OF COMMON BILE DUCT OBSTRUCTION: INITIAL OPACIFICATION OF INTRAHEPATIC DUCTS. (Eng.) Black, E. B.; Ferrucci, J. T., Jr. (Massachusetts General Hosp., Boston, MA 02114). *Am. J. Roentgenol.* 130(1):61-65; 1978.

The dynamic patterns of biliary contrast flow during i.v. cholangiography are discussed, and a previously undescribed cholangiographic sign of common duct obstruction is described. This sign--initial visualization of proximal intrahepatic ducts--was observed in 26 patients with surgically proven obstructive disease of the distal common duct. In all cases, opacification of intrahepatic biliary radicles occurred on standard interval films prior to visualization of the extrahepatic common bile duct, the reverse of the normal sequence. The abnormal opacification pattern reflects stasis of bile flow in the presence of distal obstruction and seems analogous to the urographic finding of opacified intrarenal calyces as the initial manifestation of distal ureteral obstruction. Recognition of the alteration in the initial cholangiographic opacification sequence signals the need for delayed films to confirm the diagnosis of a distal choledochal obstruction.

5343 ENDOSCOPY IN PEDIATRIC PATIENTS WITH UPPER GASTROINTESTINAL BLEEDING. (Eng.) Akasaka, Y.; Misaki, F.; Miyaoka, T.; Nakajima, M.; Kawai, K. (Kyoto Prefectural Univ. Medicine, Kyoto, Japan). *Gastrointest. Endosc.* 23(4):199-200; 1977.

5344 UPPER GASTROINTESTINAL FIBEROPTIC ENDOSCOPY IN PEDIATRIC PATIENTS. (Eng.) Ament, M. E.; Christie, D. L. (Univ. California at Los Angeles Center Health Sciences, Los Angeles, CA 90024). *Gastroenterology* 72(6):1244-1248; 1977.

5345 COMPARISON OF DOUBLE-CONTRAST RADIOLOGY, STANDARD RADIOLOGY, ENDOSCOPY, ALSO OF HISTOLOGY AND CYTOLOGY IN THE DIAGNOSIS OF GASTRIC CANCER [Abstract]. (Eng.) MacKenzie, J. F.; Rogers, I. M.; Moule, B.; Young, J. A.; Hughes, H. E.; Lee, F. D.; *et al.* (Royal Infirmary, Glasgow, Scotland). *Gut* 18(5):A416; 1977.

5346 EXPLORING HIDDEN PASSAGES: NEW LOOK AT PANCREATIC AND BILIARY DUCTS. (Eng.) Levy, M. (St. Louis Park Medical Center, Minneapolis, MN). *Minn. Med.* 60(5):335-338; 1977.

5347 A SIMPLE DISCRIMINANT FUNCTION FOR HEPATIC DISEASE. (Eng.) Hamilton, M. (Dept. Psychiatry, Univ. Leeds, 15 Hyde Terrace, Leeds, LS2 9LT, England). *J. Clin. Pathol.* 30(5):454-459; 1977.

5348 A CRITICAL EVALUATION OF A PROCEDURE FOR MEASUREMENT OF SERUM BILE ACIDS BY RADIOIMMUNOASSAY. (Eng.) Mihas, A. A.; Spenney, J. G.; Hirschowitz, B. I.; Gibson, R. G. (Div. Gastroenterology, Univ. Alabama, Birmingham, AL 35294). *Clin. Chim. Acta* 76(3):389-397; 1977.

5349 A STUDY OF FILLING DEFECTS IN THE LIVER AND SPLEEN WITH MULTIPLE RADIONUCLIDES. (Eng.) Yeh, S. D. J.; Leeper, R. D.; Benua, R. S. (Memorial Sloan-Kettering Cancer Center, New York, NY). *Clin. Bull.* 7(1):3-12; 1977.

5350 LIVER SCAN IN THE DIAGNOSIS OF CONGENITAL DIAPHRAGMATIC HERNIA. (Eng.) Magilner, A. D. (Temple Univ. Sch. Medicine, Philadelphia, PA). *Pa. Med.* 80(4):58-59; 1977.

5351 DIAGNOSTIC SIGNIFICANCE OF THE PANCREATIC DISPLACEMENT WITH EXTRAPANCREATIC OVAL-SHAPED LOW ACTIVITY AREA ON SCINTIGRAM. (Eng.) Watanabe, K.; Nakayama, C.; Kamoi, I.; Matsuura, K. (Kyushu Univ. Sch. Medicine, Fukuoka 812, Japan). *Radiol. Clin. (Basel)* 46(2):130-139; 1977.

5352 AMYLASE THERMOLABILITY: ITS APPLICATION IN THE DIAGNOSIS OF ACUTE PANCREATITIS AND PANCREATIC PSEUDOCYSTS [Abstract]. (Eng.) Brodie, M. J.; Donaldson, L. A.; McIntosh, W.; Joffe, S. N. (Stobhill General Hosp., Glasgow, Scotland). *Gut* 18(5):A415-A416; 1977.

5353 HEMORRHAGES OF THE DIGESTIVE TRACT AND ARTERIOGRAPHY: PRESENT VALUE AND PER-

SPECTIVES. (Fre.) Rabin, A.; Drouillard, J.; Leveque, A. M.; Lotte, P.; Delorme, G. (Hopital Saint-Andre, 1 rue Jean Burguet, F 33075 Bordeaux Cedex, France). *Ann. Radiol.* 20(6):567-572; 1977.

5354 ENDOSCOPY OF THE UPPER GASTROINTESTINAL TRACT. (Ger.) Schwamberger, K. (Chirurgische Universitats-Klinik, Anichstrasse 35, A-6020 Innsbruck, Austria). *Therapiewoche* 28(1): 102-111, *passim;* 1978.

5355 ESOPHAGEAL ENDOSCOPY AND BIOPSY. (Ger.) Hauzeur, F. (Klinik fur Innere Medizin, Wilhelm-Pieck-Universitat, Ernst-Heydemann-Strasse, 25 Rostock, E. Germany). *Z. Gesamte Inn. Med.* 31 (21):869-872; 1976.

5356 VALUE OF X-RAY IN THE DIAGNOSIS OF DISTURBANCES OF INTESTINAL PASSAGE IN INFANCY. (Hun.) Koteles, G.; Szirmai, Z.; Ujvary, M. (Rontgenosztaly, Madarasz utcai Csecsemo es Gyermekkorhaz, Budapest, Hungary). *Orv. Hetil.* 117(50):3036-3039; 1976.

5357 DIAGNOSTIC RELEVANCE OF ENDOSCOPY OF THE DUODENAL BULB. (Ger.) Petzold, H.; Rogos, R.; Kuklinski, B. (Medizinische Klinik, Karl-Marx-Universitat, Johannisallee 32, 701 Leipzig, E. Germany). *Z. Gesamte Inn. Med.* 31(21):876-878; 1976.

5358 DOUBLE-CONTRAST ENEMA IN THE STUDY OF BENIGN AND MALIGNANT LESIONS OF THE LARGE INTESTINE. (Ita.) Brusori, G.; Bartalena, D.; Bassi, F.; Bartalena, G.; Pezzi, A.; Ricci-Maccarini, P.; *et al.* (No affiliation given). *Bull. Sci. Med.* 149(2):130-144; 1977.

5359 VALUE OF DOUBLE-CONTRAST TECHNIQUE IN COLONIC RADIOLOGY: REPORT OF 1,553 EXAMINATIONS. (Fre.) Regent, D.; Bigard, M.; Hodez, Cl.; Pierron, J. M.; Roussel, J. (C.H.R. de Nancy-Brabois, Nancy, France). *Ann. Med. Nancy* (15): 1179-1186; 1976.

5360 EXPERIENCE WITH COLOSCOPY. (Ger.) Jacobasch, K. H. (Zentralinstitut fur Krebsforschung der Akademie der Wissenschaften der DDR, Lindenberger Weg 80, 1115 Berlin-Buch, E. Germany). *Z. Gesamte Inn. Med.* 31(21):893-897; 1976.

5361 RECOMMENDATIONS FOR THE STANDARDIZATION OF RETROGRADE X-RAY CONTRAST EXAMINATIONS OF THE COLON IN CHILDREN. (Ger.) Berger, G.; Himmel, D.; Hormann, D.; Nitz, I.; Preuss, H. J.; Rupprecht, E. (Bereichs Medizin, Karl-Marx-Universitat, Oststr. 21/25, DDR-705 Leipzig, E. Germany). *Dtsch. Gesundheitsw.* 32(45):2134-2137; 1977.

5362 CYTOLOGICAL DIAGNOSIS OF ALLERGIC GASTRITIS. (Rus.) Kachalai, D. P.; Larionov, V. G. (All-Union Scientific Res. Inst. Hygiene, Toxicology, Pesticides, Polymers and Plastic Materials, Kiev, USSR). *Vrach. Delo* (3):38-40; 1977.

5363 GASTROFIBROSCOPIC CRITERIA FOR DIAGNOSIS OF CHRONIC GASTRITIS. (Rus.) Glubochenko, V. G. (Dept. Therapy, Chernovtsy Medical Inst., Chernovtsy, USSR). *Vrach. Delo* (7):82-85; 1977.

5364 LUNDH TEST, A VALUABLE METHOD FOR THE INVESTIGATION OF THE EXOCRINE FUNCTION OF THE PANCREAS. (Hun.) Pap, A.; Varro, V. (I. Belgyogyaszati Klinika, Szegedi Orvostudomanyi Egyetem, Szeged, Hungary). *Orv. Hetil.* 118(35):2078-2080; 1977.

5365 SECRETIN-PANCREOZYMIN TEST IN ABSTINENT HEALTHY SUBJECTS. (Spa.) Pena Yanez, A.; Salmeron Mora, F. J.; Mora Lara, J.; Aguilar Martinez, J. L.; Rico Irles, J. (Hospital Clinico, Granada, Spain). *Rev. Esp. Enferm. Apar. Dig.* 51(6):679-700; 1977.

5366 ENDOSCOPIC RETROGRADE PANCREATICOGRAPHY AND PANCREATIC SONOGRAPHY: A CRITICAL COMPARISON. (Ger.) Holtz, U.; Falck, J.; Franken, F. H. (Krankenhaus St. Josef, Wuppertal-Elberfeld, W. Germany). *Z. Gastroenterol.* 15(10):600; 1977.

5367 VALUE OF ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATICOGRAPHY IN THE DIFFERENTIAL DIAGNOSIS OF CHRONIC PANCREATITIS AND CARCINOMA OF THE PANCREAS. (Hun.) Tulassay, Z.; Papp, J.; Hajos, E.; Kollin, E. (I. Belgyogyaszati Klinika, Semmelweis Orvostudomanyi Egyetem, Budapest, Hungary). *Orv. Hetil.* 118(47):2833-2838; 1977.

5368 RECENT ACHIEVEMENTS IN HEPATOLOGY: LAPAROGRAPHIC PICTURE OF HEPATOPATHIES. (Ita.) Salerno, G. (Ospedale Maggiore di Novara, Novara, Italy). *Minerva Dietol. Gastroenterol.* 23(2):107-113; 1977.

5369 ESOPHAGOSCOPIC PICTURE OF HEPATOPATHY. (Ita.) Fichera, G.; Maroni, G. C.; Facchinetti, F. (Clinica Chirurgica Generale I, Universita di Milano, Milan, Italy). *Minerva Dietol. Gastroenterol.* 23(2):99-102; 1977.

5370 ARTERIOGRAPHY IN THE DIAGNOSIS OF EXPANSIVE HEPATIC PROCESSES. (Ita.) Galloni, S. S.; Troiso, A. (Ospedale Maggiore, Bologna, Italy). *Ann. Radiol. Diagn. (Bologna)* 46(20):125-146; 1976.

5371 EVALUATION OF ^{99m}Tc-HIDA COMPLEX AS A CHOLESCINTIGRAPHIC AGENT. (Jpn.) Saji, H.; Yokoyama, A.; Arano, Y.; Tanaka, H.; Odori, T.; Morita, R.; Torizuka, K. (Faculty Pharmaceutical Sciences, Kyoto Univ., Yoshida Shimoadachi-cho, Sakyo-Ku, Kyoto 66, Japan). *Radioisotopes* 26(10): 702-707; 1977.

5372 HEPATOBILIARY SCINTIGRAPHY WITH ^{99m}Tc-DIETHYL-IDA. (Ger.) Biersack, H. J.; Thelen, M.; Knopp, R.; Breuel H. P.; Winkler, C. (Insitut fur klinische und experimentelle Nuklearmedizin, Universitat Bonn, Bonn, W. Germany). *Fortschr. Geb. Roentgenstr. Nuklearmed.* 127(5):422-427; 1977.

5373 POLYCYSTIC LIVER DISEASE: HEPATOBILIARY SEQUENTIAL SCINTIGRAPHY IN COMPARISON WITH OTHER DIAGNOSTIC PROCEDURES. (Ger.) Reichelt, H. G. (Dept. Radiologie der Medizinischen Hochschule, Karl-Wiechert-Allee 9, D-3000 Hannover 61, W. Germany). *Radiologe* 17(9):396-400; 1977.

5374 HEPATOBILIARY SEQUENTIAL SCINTIGRAPHY: DEVELOPMENTS, METHODS, AND RECOMMENDATIONS FOR ITS CLINICAL USE: EXPERIENCE IN 350 PATIENTS WITH ^{99m}Tc-SOLCOSCINT-HEPATOBIDA. (Ger.) Reichelt, H. G. (Department fur Radiologie der Medizinischen Hochschule Hannover, 3000 Hannover 61, W. Germany). *Fortschr. Geb. Roentgenstr. Nuklearmed.* 127(5): 427-433; 1977.

5375 COMPUTERIZED AXIAL TOMOGRAPHY OF THE LIVER. (Fre.) Osteaux, M.; Striyven, J.; Bleiberg, H.; Peetrons, Ph., Engelholm, L.; Jeanmart, L. (No affiliation given). *Rev. Fr. Gastroenterol.* (134):58; 1977.

5376 USE OF THE HEMAGGLUTINATION REACTION IN THE SEROLOGICAL DIAGNOSIS OF SCHISTOSOMIASIS. (Fre.) Tribouley, J.; Tribouley-Duret, J.; Appriou, M.; Bernard, D.; Pautrizel, R. (Laboratoire d'Immunologie et de Biologie Parasitaire, Universite de Bordeaux II, Bordeaux, France). *Bull. W.H.O.* 54(6):695-702; 1976.

See also, 5075, 5100, 5104, 5105, 5227, 5262, 5381, 5386, 5389, 5433, 5440, 5443, 5447, 5454, 5455, 5460, 5495, 5504, 5512, 5516, 5523, 5526, 5539, 5546, 5553, 5564, 5568, 5578, 5579, 5590, 5597, 5608, 5610, 5626, 5634, 5646, 5649, 5656, 5663, 5673, 5674, 5680, 5684, 5721, 5749, 5758, 5764, 5807, 5808, 5812, 5822, 5840, 5842.

GASTROINTESTINAL DISEASES

ESOPHAGUS

5377 LONGITUDINAL ESOPHAGEAL BANDS ASSOCIATED WITH ESOPHAGEAL APERISTALSIS: SPECULATIONS ON PATHOGENESIS. (Eng.) Stillman, A. E.; Larter, W.; Goldman, D. S. (5200 E. Grant Rd., Suite 611, Tucson, AZ 85712). *Gastroenterology* 74(3):592-594; 1978.

The case of a 6-yr-old girl with ataxia telangiectasia syndrome who was found to have multiple bands longitudinally traversing her esophagus and esophageal aperistalsis is presented. In the past, the patient was also known to have had esophageal candidiasis. The bands may have been congenital or may have been produced when linear ulcers caused by fungal esophagitis undermined mucosal strips and then healed, leaving tissue bands attached only at their extremities to the esophageal wall. The esophageal motor dysfunction may have been attributable to esophageal candidiasis or may have been a hitherto unrecognized component of the ataxia telangiectasia syndrome.

5378 MALIGNANT TRANSFORMATION OF ESOPHAGEAL COLUMNAR EPITHELIUM. (Eng.) Berenson, M. M.; Riddell, R. H.; Skinner, D. B.; Freston, J. W. (Univ. Medical Center, Salt Lake City, UT 84132). *Cancer* 41(2):554-561; 1978.

Two patients with esophageal columnar epithelium in which microinvasive adenocarcinoma developed are described. The first patient had multiple foci of carcinoma *in situ* contiguous with epithelium resembling gastric and intestinal mucosa. The other patient had signet-ring type adenocarcinoma. Surveillance for malignant transformation in columnar esophageal epithelium should be routinely performed, and because of its focal nature, multiple biopsies and cytologic examination should be carried out. The presence of carcinoma *in situ* should lead to consideration of excision of the affected esophagus.

5379 CHRONIC MUCOCUTANEOUS CANDIDIASIS: RADIOLOGIC ABNORMALITIES IN THE ESOPHAGUS. (Eng.) Rohrmann, C. A., Jr.; Kidd, R. (Univ. Washington Sch. Medicine, Seattle, WA 98195). *Am. J. Roentgenol.* 130(3):473-476; 1978.

The clinical and radiographic features of four new and four previously reported cases of esophageal chronic mucocutaneous candidiasis are presented. Esophageal narrowing was found in all patients; it was focal in six and diffuse in two. Motor abnormalities were common, but mucosal changes seen characteristically in acute candidal esophagitis were unusual. Esophageal intramural pseudodiverticulosis was documented in one patient, substantiating the belief that *Candida* may be the etiologic agent in some patients with this condition.

5380 CONTROLLED TRIAL OF A NEW DOSAGE FORM OF CARBENOXOLONE (PYROGASTRONE) IN THE TREATMENT OF REFLUX ESOPHAGITIS. (Eng.) Reed, P. I.; Davies, W. A. (Hammersmith Hosp., London W12 OHS, England). *Am. J. Dig. Dis.* 23(2):161-165; 1978.

A new preparation combining carbenoxolone sodium with alginate antacid (Pyrogastrone) was compared with alginate antacid alone (Gaviscon-like) in a controlled double-blind study in 37 patients with endoscopically proved reflux esophagitis. The patients received Pyrogastrone (100 mg/day) or alginate antacid alone, p.o., for 8 weeks. Complete remission or persistence of only minimal symptoms was obtained in 89%, and esophageal ulcer healing was achieved in 100% of subjects taking Pyrogastrone, compared with only 50% ($p<0.025$) and 33% ($p=0.02$), resp., on control treatment. Complete endoscopic healing or persistence of only minimal inflammation was seen in 95% on Pyrogastrone and 67% of controls ($p<0.05$). Mild biochemical and clinical changes were noted in 9 of 19 patients on Pyrogastrone and 6 of 18 on the control drug, but none required treatment or alteration in regime. Thus, Pyrogastrone is more effective in the treatment of reflux esophagitis than the most efficacious compound in current use.

5381 AN ASSESSMENT OF THE ACCURACY OF MODERN ENDOSCOPIC DIAGNOSIS OF OESOPHAGEAL STRICTURE. (Eng.) Eastman, M. C.; Gear, M. W. L.; Nicol, A. (Gloucestershire Royal Hosp., Gloucestershire, England). *Br. J. Surg.* 63(3):182-185; 1978.

The results of 135 fiberoptic endoscopic examinations of 115 patients with benign or malignant esophageal strictures were studied to assess the accuracy of endoscopic diagnosis of esophageal stricture. The endoscopic diagnosis was correct in 90%, uncertain in 3%, and incorrect in 7% of these cases. Target biopsy and brush cytology each made a significant contribution to diagnosis. The routine collection of cytological specimens in addition to the more commonly obtained histological specimens is strongly advocated. The mean survival in 58 cases of malignant stricture was 6 months, which supports the assumption that a stricture is likely to be benign if 12 months have elapsed without signs of malignancy.

5382 DOES THE OESOPHAGEAL BALLOON COMPRESS OESOPHAGEAL VARICES? (Eng.) Agger, P.; Andersen, J. R.; Burcharth, F. (Gentofte Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 13 (2):225-227; 1978.

To investigate the mechanism by which the esophageal balloon stops bleeding from esophageal varices, the pressure transmitted to the esophageal wall

was measured in three patients with bleeding esophageal varices controlled by balloon tamponade. The pressure transmitted was considerably lower than the pressure inflated (5.1, 10.3, and 29.0 mm Hg with an inflation pressure of 40 mm Hg), and all patients suffered retrosternal pain when the transmitted pressure rose to 40 mm Hg. Furthermore, the diameters of esophageal balloons of 23 Sengstaken-Blakemore tubes (Rusch) were measured at increasing inflation pressure. The compliance was very high. All balloons bulged at median inflation pressures of 75 mm Hg, and the pressures fell to a median of 55 mm Hg, unaffected by further inflations. The diameter at 40 mm Hg was 27.3 mm. It still remains to be explained how the esophageal balloon of the Sengstaken-Blakemore tube effects hemostasis in bleeding esophageal varices.

5383 PROBLEMS OF ACUTE UPPER GASTROINTESTINAL HEMORRHAGE. (Ger.) Feifel, G.; Heberer, G. (Chirurgische Universitatsklinik, Nussbaumstrasse 20, D-8000 Munich 2, W. Germany). *Chirurg* 48(4): 204-211; 1977.

5384 SOME TYPES OF COCKTAILS IN THE TREATMENT OF REFLUX ESOPHAGITIS DUE TO ULCER DISEASE. (Rus.) Serebrina, L. A.; Mavrodiy, V. M. (Odessa Scientific Res. Inst. Balneology, Odessa, USSR). *Vrach. Delo* (3):17-20; 1977.

5385 SURGICAL TREATMENT OF ADULTS WITH HIATAL HERNIA. (Ita.) Tantini, E. (Istituto di Semeiotica Chirurgica, Universita degli Studi, Padua [Sedo di Verona], Italy). *Minerva Med.* 68(31): 2147-2149; 1977.

5386 MALLORY-WEISS SYNDROME: REPORT OF 68 CASES DIAGNOSED AMONG 603 PATIENTS WITH DIGESTIVE TRACT HEMORRHAGE AT SAINT-LUC HOSPITAL AND AT THE MONTREAL GASTROENTEROLOGY CENTER. (Fre.) Farley, A.; Levesque, D.; Archambault, A.; Gagnon, M.; Giroux, Y.; Gosselin, D.; *et al.* (Centre de Gastroenterologie de Montreal, suite 101, 235 est, boul. Dorchester, Montreal, Quebec, Canada). *Union Med. Can.* 106(5):652-656; 1977.

5387 CLINICO-ROENTGENOLOGICAL CHARACTERISTICS OF RETROSTERNAL SMALL INTESTINE ESOPHAGUS. (Rus.) Fomin, P. D.; Brovko, T. A. (Kiev Medical Inst., Kiev, USSR). *Klin. Khir.* (3):6-10; 1977.

5388 SURGICAL TREATMENT OF ESOPHAGEAL OBSTRUCTION. (Rus.) Shalimov, A. A.; Goyer, Ya. V.; Sayenko, V. F.; Shalimov, S. A. (Kiev Scientific Res. Inst. Clinical Experimental Surgery, Kiev, USSR). *Klin. Khir.* (3):1-6; 1977.

5389 ROENTGENO-MANOMETRIC CHARACTERISTICS OF ESOPHAGEAL FUNCTIONAL STATE IN SCLERODERMA SYSTEMICA, RHEUMATOID ARTHRITIS, AND SYSTEMIC LUPUS ERYTHEMATOSIS. (Rus.) Zhegin, V. A.; Friesen, B. N. (Iarosvlavl Medical Inst., Iaroslavl, USSR). *Vestn. Rentgenol. Radiol.* (2):3-10; 1977.

5390 NEONATAL ANTERIOR ESOPHAGEAL PERFORATION. (Eng.) Stein, R. T.; Wall, P. M.; Kaufman, R. A.; Lamprecht, C.; Roloff, D. W. (Univ. Michigan Medical Center, Ann Arbor, MI 48109). *Pediatrics* 60(5):744-746; 1977.

5391 CENTRAL HEMODYNAMICS IN ACUTE GASTROINTESTINAL BLEEDING. (Eng.) Sorensen, M. B.; Christiansen, L. A.; Malmstrom, J.; Bille-Brahe, N. E. (Rigshospitalet, Copenhagen, Denmark). *Surg. Gynecol. Obstet.* 145(5):685-690; 1977.

5392 OESOPHAGEAL ATRESIA: TRIUMPH AND TRAGEDY. (Eng.) Rickham, P. P.; Stauffer, U. G.; Cheng, S. K. (Univ. Children's Hosp., Steinwiesstr. 75, 8032 Zurich, Switzerland). *Aust. N.Z. J. Surg.* 47(2):138-143; 1977.

5393 BOERHAAVE'S SYNDROME: SPONTANEOUS FORMATION OF AN ESOPHAGEAL-BRONCHIAL FISTULA. (Eng.) Zenone, E. A.; Trotman, B. W. (Univ. Pennsylvania Sch. Medicine, Philadelphia, PA). *JAMA* 238(19):2048-2049; 1977.

5394 SO-CALLED PSEUDOSARCOMA OF THE ESOPHAGUS. NODAL METASTASES OF THE SPINDLE CELL ELEMENT. (Eng.) Martin, M. R.; Kahn, L. B. (Univ. North Carolina Sch. Medicine, Chapel Hill, NC 27514). *Arch. Pathol. Lab. Med.* 101(11):604-609; 1977.

5395 ABNORMAL GASTRIC EMPTYING IN PATIENTS WITH GASTROESOPHAGEAL REFLUX. (Eng.) Little, A. G.; DeMeester, T. R.; Rezai-Zadeh, K.; Skinner, D. B. (Univ. Chicago Pritzker Sch. Medicine, Chicago, IL). *Surg. Forum* 28:347-348; 1977.

5396 MIDESOPHAGEAL WEB IN ADULTS. (Eng.) Ikard, R. W.; Rosen, H. E. (Park View Hosp., Nashville, TN). *Ann. Thorac. Surg.* 24(4): 355-358; 1977.

5397 VARICEAL HEMORRHAGE AMONG PATIENTS WITH VARICES AND UPPER GASTROINTESTINAL HEMORRHAGE. (Eng.) Pitcher, J. L. (William Beaumont Army Medical Center, P.O. Box 70031, El Paso, TX 79920). *South. Med. J.* 70(10):1183-1185; 1977.

5398 ESOPHAGEAL PAPILLOMATOSIS: CASE REPORT. (Eng.) Nuwayhid, N. S.; Ballard, E. T.; Cotton, R. (Univ. Cincinnati Medical Center, Cincinnati, OH 45267). *Ann. Otol. Rhinol. Laryngol.* 86(5, Part 1):623-625; 1977.

5399 INTRAMURAL PSEUDODIVERTICULOSIS OF THE ESOPHAGUS. (Eng.) Shapiro, M. J.; Sloan, W. C. (New Jersey Medical Society, 150 South 19th St., Newark, NJ 07107). *Ann. Otol. Rhinol. Laryngol.* 86(5, Part 1):594-597; 1977.

5400 LARYNGOTRACHEOESOPHAGEAL CLEFT: THE ANTERIOR APPROACH. (Eng.) Bell, D. W.; Christiansen, T. A.; Smith, T. E., Jr.; Stucker, F. J. (Chestnut Hill Medical Center, 25 Boylston St., Chestnut Hill, MA 02167). *Ann. Otol. Rhinol. Laryngol.* 86(5, Part 1):616-622; 1977.

See also, 5127, 5131, 5297, 5298, 5325, 5343, 5354, 5355, 5401, 5430, 5445, 5463, 5467, 5471, 5503, 5730, 5731, 5776.

STOMACH

5401 THE INTERRELATIONS OF GASTRIN RELEASE, ANTRAL GASTRIN CONCENTRATION AND ACID SECRETION RATE. (Eng.) Hughes, W. S.; Wharton, E. (Univ. Texas Medical Branch, Galveston, TX 77550). *Digestion* 17(2):151-158; 1978.

The interrelations of meal stimulated gastrin release, antral gastrin concentration (AGC), and acid secretion rate were examined in 72 patients with gastrointestinal symptoms. Gastrin release calculated as the integrated gastrin output was directly related to AGC ($r=0.50$, $p<0.001$) and inversely related to maximum acid output (MAO, $r=-0.31$, $p<0.01$). The relation between integrated gastrin output and AGC was significant in 21 patients with low acid secretion rates (MAO of <10 mEq/hr, $r=0.66$, $p<0.01$) and in 27 patients with normal acid secretion rates (MAO of 10-25 mEq/hr, $r=0.56$, $p<0.05$), but not in 24 patients with high acid secretion rates (MAO of >25 mEq/hr, $r=0.35$, $p>0.05$). A weak inverse relation between AGC and MAO may exist in patients with low acid secretion rates ($r=0.40$, $p<0.10$). Considered together by using multiple regression procedures, AGC and MAO explained less than half of the variability in meal stimulated gastrin release. The findings suggest that the exceptionally high serum gastrin levels in patients with gastric atrophy may be due to a combination of a high AGC and a low MAO.

5402 SERUM LEVEL OF IMMUNOREACTIVE GASTRIN: INFLUENCE OF KIDNEY FUNCTION. (Eng.) Hallgren, R.; Karlsson, F. A.; Lundqvist, G. (Univ. Hosp., S-750 14 Uppsala, Sweden). *Gut* 19(3):207-213; 1978.

The influence of the glomerular filtration rate (GFR) on the serum levels of gastrin and of β_2-microglobulin were investigated in 70 patients with chronically reduced GFR as estimated by ^{51}Cr-EDTA clearance, creatinine, and β_2-microglobulin values and in 31 other patients with uremia and on chronic maintenance hemodialysis (including 11 renal transplant patients). A strong dependence upon GFR was found among the former 70 patients, although the correlation between gastrin levels and GFR ($r=0.45$, $p<0.001$) was not as high as that between β_2-microglobulin and GFR ($r=0.93$, $p<0.001$), indicating the existence of extrarenal factors regulating the levels of circulating gastrin. In the group of 31 patients on maintenance dialysis, the mean gastrin level was 65.9 pM--that is, a four-fold increase compared to healthy subjects. Three uremic patients had pronounced rises in serum gastrin in the range 800-1,800 pM. The influence of acute alterations of kidney function on serum gastrin was studied in the 11 patients undergoing renal transplantation. In addition to a GFR dependence, the results indicated the existence of feedback mechanisms in gastrin homeostasis. Although the clinical importance of the increased gastrin levels in renal failure is unknown, hypergastrinemia occurs with sufficient frequency to be involved in upper gastrointestinal complications of uremic patients.

5403 COMPARISON OF 'EARLY GASTRIC CANCER' IN BRITAIN AND JAPAN. (Eng.) Evans, D. M. D.; Craven, J. L.; Murphy, F.; Cleary, B. K. (Llandough Hosp., Penarth, Cardiff, Wales). *Gut* 19(1):1-9; 1978.

To determine whether Japanese gastric cancer is the same as the European variant, the morphology, histology, and behavior of "early gastric cancer" in one British series were compared with those in a Japanese series. Before the introduction of endoscopy, 4 of 720 cases of gastric cancer were diagnosed before the cancer had breached the muscularis propria. Using endoscopy and endoscopic biopsy, 10 of 101 cases of gastric cancer were diagnosed at this "early" stage. The clinical, morphological, and histological characteristics of these cancers were similar to those in the Japanese series. The results suggest that a higher proportion of British gastric cancers could be diagnosed

at an "early" stage by more intensive investigation of dyspeptic patients using up-to-date radiological techniques, fiberoptic endoscopy, and endoscopic biopsy.

5404 PATHOGENESIS OF GASTRIC CANCER IN PERNICIOUS ANAEMIA. (Eng.) Ruddell, W. S. J.; Bone, E. S.; Hill, M. J.; Walters, C. L. (General Infirmary, Leeds 1, England). *Lancet* 1(8063): 521-523; 1978.

To investigate the increased incidence of gastric cancer observed in pernicious anemia (PA), nitrite concentrations were determined in the gastric juice from 13 fasting patients with PA and 13 age-matched controls, and bacterial studies were carried out. In an attempt to mimic the situation *in vivo*, simulated PA gastric juice was prepared *in vitro* and incubated with bacteria derived from the gastric juice of the patients with PA; nitrite was added to produce a concentration approximating that found *in vivo*. The incubate was extracted, and the extract analyzed for volatile nitrosamines by gas chromatography coupled with a thermal energy analyzer. The mean nitrite concentration in gastric juice from the fasting patients with PA was nearly 50-fold greater than that of age-matched controls ($p<0.001$). The number of bacteria in the gastric juice of PA patients was also greatly increased ($p<0.001$). Small amounts of volatile nitrosamines were detected in the simulated PA gastric juice *in vitro*, after addition of nitrite. If similar nitrosation occurs *in vivo*, the intragastric production of carcinogenic *N*-nitroso compounds could explain the high incidence of gastric cancer in patients with PA.

5405 ADENOCARCINOMA OF THE STOMACH: REVIEW OF 1,497 CASES. (Eng.) Dupont, J. B., Jr.; Lee, J. R.; Burton, G. R.; Cohn, I., Jr. (Louisiana State Univ. Sch. Medicine, 1542 Tulane Ave., New Orleans, LA 70112). *Cancer* 41(3):941-947; 1978.

The records of 1,497 patients with histologically proven adenocarcinoma of the stomach are reviewed in one hospital over the 25-yr period 1948 to 1973. The operability rate was 82%, and the resectability rate was 48%. Gastric carcinoma predominated in men and Negroes. Necropsy studies indicated a similar frequency of involvement of various organs in patients not operated upon as well as those subjected to a prior operation, which suggests the need for therapy aimed at a wider base than the primary organ. The overall 5-yr survival rate was 7.4% and varied from 2.0% after esophagogastrectomy to 22.1% after radical subtotal gastrectomy and to 30.3% for those with localized disease. One hundred one patients survived 5 yr or more, and 5.4% survived 10 yr or more after the diagnosis of gastric cancer. Radical subtotal gastrectomy gave the best results in this series, whether measured in terms of median survival, 5-yr survival, or operative mortality. Esophagogastrectomy and bypass procedures had high mortality and low survival rates, and should be reserved for special conditions.

5406 DISSEMINATED HISTOPLASMOSIS PRODUCING HYPERTROPHIC GASTRIC FOLDS. (Eng.) Fisher, J. R.; Sanowski, R. A. (Phoenix Indian Medical Center, 4212 N. 16 St., Phoenix, AZ 85016). *Am. J. Dig. Dis.* 23(3):282-285; 1978.

The case of a 31-yr-old man with disseminated histoplasmosis who had hypertrophic gastric rugae on upper gastrointestinal x-ray is described. Endoscopic biopsy of the giant folds revealed submucosal fungal elements that subsequently grew *Histoplasma capsulatum* on culture. This patient represents the first reported case of histoplasmosis involving the stomach that caused giant rugae. Recognition of this infectious process and the differentiation of it from malignancy allowed for its prompt treatment with amphotericin B and good clinical response, although the patient was lost to follow-up after 10 weeks of treatment.

5407 CIMETIDINE: PROPHYLAXIS AGAINST UPPER GASTROINTESTINAL HAEMORRHAGE AFTER RENAL TRANSPLANTATION. (Eng.) Jones, R. H.; Rudge, C. J.; Bewick, M.; Parsons, V.; Weston, M. J. (King's Coll. Hosp., London SE22, England). *Br. Med. J.* 1(6110):398-400; 1978.

To assess the place of cimetidine for the prevention of gastrointestinal hemorrhage following renal transplantation, the incidence of upper gastrointestinal bleeding within 4 months of transplantation was studied in 63 patients. Thirty patients who received prophylactic cimetidine suffered no episodes of upper gastrointestinal hemorrhage, while 6 of the 33 patients who did not receive cimetidine suffered hemorrhages. One patient died as a result. The difference between the groups was significant ($p=0.016$). The results suggest that the prophylactic use of cimetidine in patients receiving renal transplants is worthwhile.

5408 CIMETIDINE IN THE TREATMENT OF GASTRIC ULCER: REVIEW AND COMMENTARY. (Eng.) Freston, J. W. (Univ. Utah Medical Center, 50 N. Medical Drive, Salt Lake City, UT 84132). *Gastroenterology* 74(2, Part 2):426-430; 1978.

The results of four complete and one incomplete controlled, double-blind trials of cimetidine therapy for gastric ulcer disease are reviewed. A sixth trial, still under way, is partially blind. Treatment duration ranged from 2 to 6 weeks; doses ranged from 0.8 to 1.2 g daily. Two studies also evaluated the influence of hospitalization on ulcer healing and symptoms. Relatively large doses of antacid taken with cimetidine confounded the evaluation of cimetidine efficacy in two of the trials, without answering the question of antacid efficacy. Cimetidine was more effective than were small doses of antacid in healing ulcers in one study but was not significantly superior to treatment with larger quantities of antacid in two other trials. The preliminary results indicate that cimetidine is more effective than carbenoxolone in healing ulcers. Hospitalization for 2 and 3 weeks conferred no ad-

vantage, but patients were not randomly assigned to hospitalization. Definitive studies on whether cessation of cimetidine therapy is followed by accelerated ulcer recurrence have not been reported. The efficacy of chronic or intermittent cimetidine therapy has not been studied in gastric ulcer disease.

5409 REDUCTION OF ASPIRIN-INDUCED GASTROINTESTINAL BLEEDING WITH CIMETIDINE. (Eng.) Welch, R. W.; Bentch, H. L.; Harris, S. C. (Univ. Texas Health Science Center at San Antonio, San Antonio, TX 78284). *Gastroenterology* 74(2, Part 2): 459-463; 1978.

The effect of cimetidine on aspirin-induced gastric bleeding was investigated in 26 arthritic patients taking fixed doses of aspirin who were found to have aspirin-induced occult gastrointestinal bleeding. The patients were given cimetidine (300 mg/day, 4 weeks) in a randomized double blind, crossover study. Autologous ^{51}Cr-labeled blood was measured in 4-day stool collections at the end of each 4-week period of placebo and cimetidine therapy in 22 acid-producing patients. Mean daily fecal blood loss was reduced during cimetidine therapy to 2.2 ± 0.3 ml/day, compared with 4.1 ± 0.7 ml/day during placebo therapy ($p=0.002$). These results emphasize the central role of gastric acid in aspirin-induced gastric mucosal bleeding and demonstrate that cimetidine exerts a protective effect on aspirin-induced mucosal bleeding. The therapeutic necessity for combining cimetidine and aspirin depends upon the seriousness of the bleeding and should be explored further by studying only those patients with clinically significant bleeding.

5410 AGE, SEX, GASTRIN AND ACID SECRETION IN DIFFERENT TYPES OF GASTRIC ULCER. (Eng.) Vezzadini, P.; Cipollini, F.; Tomassetti, P.; Bonora, G.; Cavicchi, A.; Labo, G. (Istituto di Clinica Medica e Gastroenterologia, Via G. Massarenti 9, 40138 Bologna, Italy). *Rend. Gastroenterol.* 9(3): 194-198; 1977.

Fasting serum gastrin levels, maximal acid response to pentagastrin, age, and sex distribution were studied in 124 patients with gastric ulcer to evaluate possible differences in these variables. Similar data were recorded in 119 patients with duodenal ulcer (DU) not associated with gastric ulcer. Of the 124 patients, 45 had a body ulcer (BU), 40 a prepyloric ulcer (PPU), and 39 a gastric ulcer associated with duodenal ulcer (GU-DU). The mean age of the BU patients was 57 ± 2 yr, significantly different ($p<0.01$) from the PPU (48 ± 3 yr), the GU + DU (43 ± 2 yr), and the DU (40 ± 1 yr) patients. The male/female ratio was 1.3:1 in BU, 3.0:1 in PPU, 8.7:1 in GU + DU, and 4.6:1 in DU patients. The mean fasting gastrin levels in the BU group were 147 ± 22 pg/ml, significantly different ($p<0.001$) from the PPU (52 ± 4 pg/ml), GU + DU (53 ± 5 pg/ml), and DU (49 ± 2 pg/ml) patients. The peak acid output (PAO) in BU patients was 8.1 ± 1.4 mmol/hr, significantly different ($p<0.001$) from the PPU (25.0 ± 1.9 mmol/hr), GU + DU (33.3 ± 3.1 mmol/hr), and DU (34.5 ± 1.1 mmol/hr) patients. In the BU group, there was an inverse correlation ($p<0.05$) between gastrin levels and PAO. It appears that BU differs substantially from the other two types of gastric ulcer. PPU differs from GU + DU only with regard to acid secretion.

5411 MEASUREMENT OF BILE ACIDS IN FASTING GASTRIC ASPIRATES: AN OBJECTIVE TEST FOR BILE REFLUX AFTER GASTRIC SURGERY. (Eng.) Hoare, A. M.; Keighley, M. R. B.; Starkey, B.; Alexander-Williams, J. (Wycombe General Hosp., High Wycombe, Bucks, England). *Gut* 19(3):166-169; 1978.

The concentration of bile acids were measured, as a test for duodenal reflux, in gastric aspirates from 14 patients who had had operations for peptic ulcer. Twenty patients were asymptomatic, and 22 had postoperative symptoms of the type that have been attributed to duodenogastric reflux. Samples were obtained *via* a nasogastric tube when the patients were fasting, after food, after pentagastrin, and overnight. The most useful index to discriminate between symptomatic and asymptomatic patients was the amount of bile reflux in 0.5-hr aspiration from the fasting stomach; this was termed "fasting bile reflux" (FBR) and expressed as µmol bile acids refluxing/hr. A figure greater than 120 µmol/hr was present in 17 of 22 symptomatic patients and in all who complained of bile regurgitation or bile vomiting. The FBR was less than 120 µmol/hr in all of 20 asymptomatic patients, although 13 had reflux detected radiologically and endoscopically. Measurement of bile acids in fasting gastric aspirates has proved to be the best discriminant between patients with and without symptoms.

5412 LOWER ESOPHAGEAL SPHINCTER PRESSURE AND SERUM GASTRIN LEVELS AFTER MAPPED ANTRECTOMY. (Eng.) Eckardt, V. F.; Grace, N. D.; Osborne, M. P.; Fischer, J. E. (Faulkner Hosp., 1153 Center St., Boston, MA 02130). *Arch. Intern. Med.* 138(2): 243-245; 1978.

The effect of mapped antrectomy with gastroduodenostomy on serum gastrin levels in fasting patients and on resting lower esophageal sphincter (LES) pressure was investigated to evaluate the role of endogenous gastrin in the maintenance of LES competence. Serum gastrin levels in fasting patients were lower in the 15 who had an antrectomy without vagotomy ($p<0.05$) as compared with 11 controls who had both antrectomy and vagotomy. Resting LES pressure was similar in both patients and controls and was not affected by the presence or absence of vagotomy. These findings suggest that (a) mapped antrectomy and gastroduodenostomy without vagotomy are followed by a decrease in serum gastrin and (b) resting LES pressure is not affected by mapped antrectomy and a decrease in serum gastrin level.

5413 THE VIBRATION PERCEPTION THRESHOLD IN GASTRECTOMIZED PATIENTS WITH LOW SERUM

B_{12}: A CLINICAL AND BIOTHESIOMETRIC FOLLOW-UP AFTER INTENSIVE B_{12} THERAPY. (Eng.) Roos, D. (Sundvaenget 35, 2900 Hellerup, Denmark). *Acta Neurol. Scand.* 56(6):551-562; 1977.

The vibration perception threshold (VPT) was determined in vitamin B_{12}-deficient (<200 pg/ml) gastrectomized patients and controls to determine whether VPT is significantly higher in the vitamin-deficient gastrectomized patients. The course of clinical signs of neuropathy and myelopathy after 6-12 months of intensive B_{12} therapy is detailed. The values for VPT are given as the $\log_{10}$ of the minimum voltages at which the subject clearly perceived the stimuli as a vibrating sensation. In 42 gastrectomized patients, VPT was significantly elevated as compared with that in 78 controls; after allowing for age, the VPTs calculated for the gastrectomized patients were lower than those of controls by 0.07 in the pulp of the index finger, 0.09 in the medial malleolus, and 0.15 in the pulp of the big toe ($p<0.01$, 0.05, and 0.001, resp.). The neuropathologic signs of 15/25 patients receiving adequate vitamin B_{12} therapy (1 ml Betolvex®/2 weeks, group I) included paraesthesiae (10/15), regressed achilles or patellar reflexes (14/15), hypaesthesia-hypalgesia distally on the lower limbs or on the lower and upper limbs (10/15), and localized pareses and muscular atrophy (5/15). The myelopathologic signs of 16/25 patients receiving adequate vitamin B_{12} therapy (group II) included ataxia of the upper (2/16) and lower limbs (5/16), an abnormal Romberg's sign (6/16), weak extensor plantar responses (5/15), and a lack of vibration sense in spina iliaca anterior superior (4/16). Forty patients were followed up after 6-12 months of intensive vitamin B_{12} therapy. Group I patients demonstrated a remission of symptoms and signs of peripheral neuropathy, including a statistically significant reduction of the VPT measured on the medial malleolus and big toe. No reduction was observed in group II. Findings in the inadequately treated group were less definite, both as regards remission of clinical findings and VPT. In four untreated patients, the neurological symptoms and signs progressed during the follow-up period. Intensive and long-lasting treatment with vitamin B_{12} is recommended for gastrectomized patients showing signs of neuropathy.

5414 VALUE OF BILE-ACID BINDING AGENTS IN POST-VAGOTOMY DIARRHOEA. (Eng.) Taylor, T. V.; Lambert, M. E.; Torrance, H. B. (Royal Infirmary, Edinburgh EH3 9YW, England). *Lancet* 1(8065): 635-636; 1978.

The effect of agents that either bind bile acids or prevent their action on the colonic mucosa was studied in 31 patients with postvagotomy diarrhea. Fifteen patients had had vagotomy and pyloroplasty (VP) alone and 16 vagotomy, pyloroplasty, and cholecystectomy (VPC). Twelve patients who had undergone VPC improved after cholestyramine treatment (12 g/day, 4 weeks), whereas only six of those who had undergone VP improved ($p=0.044$). Aluminum hydroxide in large doses (30 ml/day, 4 weeks) improved the symptoms in five patients who had undergone VPC and one who had undergone VP. In eight patients (4 in each group) who received propranolol (60 mg/day), there was either no improvement, or the symptoms worsened. This study suggests that the excretion and chemical composition of bile and the handling of bile acids by the small intestine is of fundamental importance in the pathogenesis of postvagotomy diarrhea.

5415 ASCORBIC ACID AND CHOLINESTERASE ACTIVITY OF THE BLOOD IN GASTRODUODENITIS PATIENTS. (Rus.) Lukianchuk, V. G.; Shubravskii, A. A. (Propedeutic Dept. Internal Medicine, Chernovtsy Medical Inst., Chernovtsy, USSR). *Vrach. Delo* 8:36-38; 1976.

5416 GASTRIC ULCER TREATED BY VAGOTOMY, PYLOROPLASTY AND WEDGE-EXCISION. (Eng.) Proot, L.; Derom, F.; De Mol, J. (Dept. Surgery, State Univ. Ghent, Ghent, Belgium). *Chir. Gastroenterol.* 11(2): 181-185; 1977.

5417 SERUM CALCITONIN IN HYPERGASTRINEMIA DUE TO ACHLORHYDRIA. (Eng.) Fahrenkrug, J.; Schaffalitzky de Muckadell, O. B.; Rehfeld, J. F. (Bispebjerg Hosp., Bispebjerg Bakke 23, DK-2400 Copenhagen NV, Denmark). *Acta Endocrinol. (Kbh.)* 86(1):140-145; 1977.

5418 LATE COMPLICATIONS OF GASTRIC SURGERY: DIAGNOSIS AND TREATMENT. (Eng.) White, T. T.; Harrison, R. C. (Univ. Washington Sch. Medicine, Seattle, WA). *Surg. Annu.* 8:197-217; 1976.

5419 VAGOTOMY: THE OPTIONS. (Eng.) Kennedy, T. (Royal Victoria Hosp., Belfast, Northern Ireland). *Surg. Annu.* 8:181-195; 1976.

5420 SODIUM SALICYLATE, ASPIRIN, AND THE GASTRIC MUCOSA. (Eng.) Krantz, J. C., Jr. (Sch. Medicine, Univ. Maryland, Baltimore, MD 21201). *Am. J. Pharm.* 149(3):90-91; 1977.

5421 GASTROINTESTINAL POLYPOSIS [Abstract]. (Eng.) Nakazawa, S.; Kawaguchi, S. (Nagoya Univ., Sch. Medicine, Nagoya, Japan). *Gastroenterol. Jpn.* 12(4):332; 1977.

5422 GASTRIC POLYPS IN RELATION TO ENDOSCOPIC ACID SECRETING FUNCTION [Abstract]. (Eng.) Tatsuta, M.; Okuda, S. (Center Adult Diseases, Osaka, Japan). *Gastroenterol. Jpn.* 12(4):331; 1977.

5423 THE RELATIONSHIP BETWEEN GASTRITIS AND THE EFFECT OF BILE SALTS ON Na, K-ATPase IN HUMAN GASTRIC MUCOSA [Abstract]. (Eng.) Little, M. P. G.; McCarthy, C. F.; Mooney, P. A.;

Walters, K. M. (Dept. Medicine, Univ. Coll., Galway, Ireland). *J. Physiol. (Lond.)* 273(2):61P-62P; 1977.

5424 EFFECTS OF TOTAL GASTRECTOMY ON EXOCRINE PANCREATIC FUNCTION IN MAN [Abstract]. (Eng.) Gullo, L.; Costa, P. L.; Ventrucci, M.; Fontana, G.; Labo, G. (Dept. Medicine, Univ. Bologna, Bologna, Italy). *Ir. J. Med. Sci.* 146(Suppl. 1):29; 1977.

5425 DUMPING ATTACKS [Letter to Editor]. (Eng.) Morris, R. (501 Ingram's Corner, Twist St., Hillbrow, Johannesburg, South Africa). *S. Afr. Med. J.* 52(14):550; 1977.

5426 CHARACTERISTIC FEATURES OF GASTRIC SECRETION IN VARIOUS GASTRIC DISEASES [Abstract]. (Eng.) Mori, H.; Kitamura, T.; Matsuo, Y. (Faculty Medicine, Univ. Tokyo, Tokyo, Japan). *Adv. Exp. Med. Biol.* 89:530; 1977.

5427 VARIOLIFORM GASTRITIS OR SUPERFICIAL HYPERTROPHIC GASTRITIS [Abstract]. (Eng.) Andre, C.; Lambert, R.; Moulinier, B.; Bugnon, B. (Hospital Edouard Herriot, Lyon, France). *Gut* 18(11):A941-A942; 1977.

5428 COMPARISON OF 'EARLY GASTRIC CANCER' IN BRITAIN AND JAPAN [Abstract]. (Eng.) Evans, D. M. D.; Craven, J. L.; Murphy, F.; Cleary, B. (Llandough Hosp., Penarth, Wales). *Gut* 18(11): A941; 1977.

5429 BILE REFLUX AND GASTRIC EMPTYING IN PATIENTS WITH COMBINED ULCER DISEASE [Abstract]. (Eng.) Gough, M. J.; Humphrey, C. S.; Feather, D. B.; Giles, G. R. (St. James' Univ. Hosp., Leeds, England). *Gut* 18(11):A950; 1977.

5430 OESOPHAGITIS AND OESOPHAGEAL STRICTURE AFTER GASTRECTOMY [Abstract]. (Eng.) Kalima, T. V.; Hakkiluoto, A. (Univ. Central Hosp., Helsinki, Finland). *Scand. J. Gastroenterol.* 12 (Suppl. 45):44; 1977.

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5467 TREATMENT OF HIGH GASTRIC ULCER. (Ger.) Gebhardt, C.; Moschinski, D.; Usmiani, J. (Krankenhaus St. Josef, Bergstrasse, D-5600 Wuppertal 1, W. Germany). *Langenbecks Arch. Chir.* 343 (4):313-318; 1977.

See also, 5141, 5163, 5168, 5173, 5297, 5306, 5308, 5343, 5345, 5354, 5363, 5380, 5383, 5384, 5388, 5395, 5397, 5469, 5474, 5476, 5479, 5482, 5483, 5485, 5487, 5493, 5494, 5495, 5497, 5526, 5532, 5538, 5540, 5595, 5765, 5776, 5781, 5782, 5809, 5816, 5824.

STOMACH

Peptic Ulcers

5468 DUODENAL MOTILITY PATTERN IN DUODENAL ULCER DISEASE. (Eng.) Borgstrom, S.; Arborelius, M., Jr. (Malmo General Hosp., S-214 01 Malmo, Sweden). *Scand. J. Gastroenterol.* 13(3):349-352; 1978.

The motility in the first part of the duodenum was studied in seven normal subjects, seven patients with gastric ulcers, and seven with duodenal ulcers by a method combining roentgen fluorography and multiple pressure recordings. A significantly lower number of retrograde motor sequences was found in patients with duodenal ulcer than in normal subjects ($p=0.05$), while patients with gastric ulcers showed no such difference. This abnormality was interpreted as a deficiency in the transport of neutralized duodenal contents from more distal parts of the duodenum up into the bulb. This abnormality may explain the lower pH observed in the duodenal bulb in subjects with duodenal ulcer and may contribute to the pathogenesis of the disease.

5469 TECHNIQUES AND ERRORS IN SCINTIGRAPHIC MEASUREMENTS OF GASTRIC EMPTYING. (Eng.) Tothill, P.; McLoughlin, G. P.; Heading, R. C. (Royal Infirmary, Edinburgh EH3 9YW, Scotland). *J. Nucl. Med.* 19(3):256-261; 1978.

A double-headed scanner was used to investigate the effects of variations of counting efficiency due to the changing depth of radioactivity during the scintigraphic measurement of gastric emptying. ^{99m}Tc and ^{113m}In were used as labels for the solid and liquid components of a meal. The depth of ^{99m}Tc within the stomach decreased by a mean of 13 mm during the first half-hour of emptying. Anterior detection alone underestimated emptying rates by

an average of 26%. Depth changes also introduced errors into "early emptying" measurements made unilaterally. Such artifacts of measurement may compromise mathematical analyses of emptying patterns.

5470 INCREASED SENSITIVITY OF GASTRIN RELEASE TO ADRENALINE IN DUODENAL ULCER. (Eng.) Brandsborg, O.; Christensen, N. J.; Lovgreen, N. A.; Brandsborg, M.; Rehfeld, J. F. (Kommunehospitalet, Aarhus, Denmark). *Gut* 19(3):202-206; 1978.

Serum gastrin concentrations were measured in 19 patients with duodenal ulcer and 21 controls before, during, and after 1-hr i.v. infusion of various doses of epinephrine (0.12 µg-6 µg/min). Basal gastrin concentrations were significantly increased in duodenal ulcer patients compared to controls ($2p<0.01$). The maximal rise in serum gastrin concentrations was obtained at a dose of 4 µg/min epinephrine in both groups of subjects, and the increase was significantly higher in duodenal ulcer patients than in controls ($2p<0.01$). Epinephrine increased predominantly the gastrin III component (gastrin-17-like) in both duodenal ulcer patients and controls. The threshold level of epinephrine-induced gastrin release was significantly lower in duodenal ulcer patients. I.v. infusion of epinephrine in a dose of 0.12 µg and 0.25 µg/min increased serum gastrin concentrations 23% and 43%, resp., but had no effect in controls. Rises in plasma epinephrine concentrations were similar in both groups of subjects in response to the various doses of catecholamine employed. Only the smallest dose (0.12 µg/min) resulted in clearly physiological variations in plasma epinephrine concentrations. The results indicate that endogenous epinephrine may stimulate gastrin secretion during physiological conditions in patients with duodenal ulcer.

5471 ENDOSCOPIC ELECTROCOAGULATION: AN ALTERNATIVE TO OPERATIVE THERAPY IN BLEEDING PEPTIC ULCER DISEASE. (Eng.) Volpicelli, N. A.; McCarthy, J. D.; Bartlett, J. D.; Badger, W. E. (Lovelace-Bataan Medical Center, 5400 Gibson Blvd., SE, Albuquerque, NM 87108). *Arch. Surg.* 113(4): 483-486; 1978.

The use of endoscopic electrocoagulation as an alternative to surgery in the treatment of bleeding peptic ulcer disease was examined in 12 high-risk patients with severely bleeding ulcers (6 duodenal, 5 gastric, 1 esophageal). Arrest of the bleeding was permanent in 10; 1 bled again 2 days later, and 1 patient died of nonulcer disease 1 day later. Although this method to control bleeding from peptic ulceration is new, it seems to offer promise especially when treating severely ill people.

5472 A COMPARISON OF UNREFINED WHEAT AND RICE DIETS IN THE MANAGEMENT OF DUODENAL ULCER. (Eng.) Malhotra, S. L. (11 Garden Reach Rd., Calcutta-43, India). *Postgrad. Med. J.* 54(627):6-9; 1978.

Unrefined wheat and rice diets in the management of duodenal ulcer were compared in 72 chronic duodenal ulcer patients who lived in a rice-eating area. Twenty-one patients were put on an unrefined wheat diet and 21 continued on their previous rice diet. After 5 yr, only 14% of the first group had had relapses compared with 81% of the second group. A similar 5-yr relapse rate (80%) was obtained in a group of 30 patients from another area with a more varied rice diet. The author attributes this difference to the increased mastication required by the unrefined wheat diet, which is associated with an increase in saliva, lower stomach acidity, and reduced bile output.

5473 EFFECT OF HISTAMINE H2-RECEPTOR ANTAGONISTS ON DELAYED HYPERSENSITIVITY. (Eng.) Avella, J.; Binder, H. J.; Madsen, J. E.; Askenase, P. W. (Yale Univ. Sch. Medicine, 333 Cedar St., New Haven, CT 06510). *Lancet* 1(8065):624-626; 1978.

To determine the effect of cimetidine treatment on cell-mediated immunity *in vivo*, the delayed skin test response to four antigens was assessed before and after 6 weeks' cimetidine therapy in patients with duodenal ulcer disease. In the eight patients who received cimetidine (300 mg q.i.d., p.o.), there was a significant increase in both erythema ($p<0.01$ at 24 hr, $p<0.005$ at 48 hr) and induration ($p<0.02$ at 48 hr) after 6 weeks' therapy. In contrast, the intensity of delayed hypersensitivity reactions at 6 weeks was not increased in eight control patients who did not receive cimetidine. These studies indicate that therapy with an H_2-receptor antagonist may be associated with an augmentation of delayed hypersensitivity responses.

5474 TREATMENT OF DUODENAL AND GASTRIC ULCERS WITH CIMETIDINE: A MULTICENTER DOUBLE-BLIND TRIAL. (Fre.) Lambert, R.; Bader, J. P.; Bernier, J.; Bertrand, J.; Betourne, C.; Gastard, J.; *et al.* (Hopital E.-Herriot, F 69374 Lyon Cedex 2, France). *Gastroenterol. Clin. Biol.* 1(11):855-860; 1977.

The efficacy of cimetidine (an H_2 histamine receptor antagonist) therapy was tested in 49 patients with gastric ulcer and 140 patients with duodenal ulcer. Cimetidine was administered daily (200 mg after each meal and 400 mg at bedtime, p.o.) for 28 days. The number of patients who were asymptomatic by day 14 or day 28 was not significantly different between cimetidine and placebo groups in the gastric ulcer patients ($0.05<p<0.06$) but was significantly different in the duodenal ulcer patients on day 28 ($p=0.01$). In patients with gastric ulcers, endoscopy revealed complete healing on day 28 in 17/24 of those on cimetidine but in only 9/25 patients taking placebos ($p<0.02$). For patients with duodenal ulcers, healing occurred by day 28 in 54/71 patients on cimetidine but in only 4/69 patients taking placebo ($p<0.04$). The patients on cimetidine also reported markedly less pain on day 28. Clinical tolerance was excellent, with no side-effects occurring, other than mild and transient elevations of the

levels of serum creatinine and transaminases in the gastric ulcer patients. Preliminary results of long-term effects of cimetidine treatment show a reduction in the number of recurrences after healing but have not yet allowed firm conclusions as to the possible toxicity or tachyphylaxy associated with prolonged treatment.

5475 INHIBITORY EFFECT OF CIMETIDINE ON GASTRIC ACID SECRETION VAGALLY ACTIVATED BY PHYSIOLOGICAL MEANS IN DUODENAL ULCER PATIENTS. (Eng.) Schoon, I. M.; Olbe, L. (Sahlgren Hosp., Goteborg, Sweden). *Gut* 19(1):27-31; 1978.

The effect of cimetidine on acid secretion evoked by physiological vagal reflex stimulation was studied in 12 patients with duodenal ulcer. Vagal activation of gastric acid secretion by modified sham feeding in six patients produced a peak acid response amounting to 52% of the peak acid output after pentagastrin stimulation (PAO_{pg}). Cholinergic reflex stimulation of gastric acid secretion by fundic distention in the other six patients produced a peak acid response of 45% of PAO_{pg}. The i.v. infusion of cimetidine (100 mg/hr) markedly inhibited the acid sham feeding response (by 90-100%) and almost abolished the acid response to fundic distention. The results suggest that gastric acid secretion evoked by physiological vagal activation in man is profoundly inhibited by H_2-receptor blocking agents.

5476 EFFECT OF PROLONGED CIMETIDINE THERAPY ON GASTRIC ACID SECRETION IN MAN. (Eng.) Barbezat, G. O.; Bank, S. (Groote Schuur Hosp., Observatory, 7925, Cape Town, South Africa). *Gut* 19 (2):151-154; 1978.

The effect of cimetidine on gastric acid secretion was investigated in a double-blind trial in which 23 patients with endoscopically confirmed duodenal ulceration received cimetidine (300 mg q.i.d. in 6 patients or 400 mg q.i.d. in 10 patients) or placebo (7 patients) for 6 weeks. Before entry into the trial, pentagastrin (6 µg/kg/hr)-stimulated gastric acid secretion after a single p.o. dose of 300 or 400 mg cimetidine was lowered by 82.1 ± 3.1% and 81.0 ± 3.5%, resp., while no significant inhibition was recorded in the patients receiving placebo (8.8%). The same test repeated after 6 weeks of continuous treatment showed that the effect of the drug was maintained, the percentage inhibition of acid secretion being of the same order as in the first test. Long-term therapy with cimetidine seems justified as it remains a potent inhibitor of gastric acid secretion despite prolonged use, and as its administration is associated with significant healing of duodenal ulcers.

5477 PREVENTION BY BEDTIME CIMETIDINE OF DUODENAL-ULCER RELAPSE. (Eng.) Blackwood, W. S.; Maudgal, D. P.; Northfield, T. C. (St. James' Hosp., London, England). *Lancet* 1(8065):626-627; 1978.

Forty-five patients with healed duodenal ulcers completed a 6-month double-blind trial to compare the effects of cimetidine and placebo on the prevention of duodenal ulcer relapse. A single bedtime dose of cimetidine (800 mg) was given, and ulcer relapse was assessed endoscopically at regular intervals. At the end of the trial, 16 of the 21 cimetidine-treated patients remained ulcer-free compared with only 3 of the 24 placebo-treated patients ($p<0.0005$). No untoward effects of this treatment were observed. Duodenal ulcer relapse is prevented by maintenance therapy with a single bedtime dose of cimetidine.

5478 EFFECT OF PYLOROPLASTY ON GASTRIC EMPTYING: LONG TERM RESULTS AS OBTAINED WITH A LABELLED TEST MEAL 14-43 MONTHS AFTER OPERATION. (Eng.) Binswanger, R. O.; Aeberhard, P.; Walther, M.; Vock, P. (Inselspital, CH-3010 Berne, Switzerland). *Br. J. Surg.* 65(1):27-29; 1978.

To evaluate the long-term effects on gastric emptying of different operations, the mean gastric transit time (t) and the half-time of gastric emptying ($t_{1/2}$) of a labeled test meal were studied in 18 patients more than 1 yr after gastric surgery for peptic ulcer and compared with those in 18 healthy controls. Of the patients, six had undergone proximal gastric vagotomy alone (PGV), six had had proximal gastric vagotomy and pyloroplasty (PGVP), and in six truncal vagotomy and pyloroplasty (TVP) had been performed. The t and $t_{1/2}$ of patients with PGV alone did not differ significantly from the values of the control group. The t and $t_{1/2}$ in patients after PGVP and TVP, however, were significantly lower than in both controls ($p<0.0025$ for PGVP, $p<0.0005$ for TVP) and patients after PGV alone ($p<0.05$ for PGVP, $p<0.005$ for TVP). There was no statistically significant difference between the groups with PGVP and TVP. The results suggest that the lasting effects of vagotomy operations on gastric emptying are due to the drainage procedure rather than the vagotomy.

5479 SELECTION OF PATIENTS FOR BILE DIVERSION SURGERY: USE OF BILE ACID MEASUREMENT IN FASTING GASTRIC ASPIRATES. (Eng.) Hoare, A. M.; McLeish, A.; Thompson, H.; Alexander-Williams, J. (Queen Elizabeth Hosp., Birmingham, England). *Gut* 19(3):163-165; 1978.

The value of diverting bile from the stomach by a Roux-en-Y procedure was assessed in 18 patients with dyspepsia and vomiting following peptic ulcer surgery. Bile regurgitation and mild epigastric pain relieved by vomiting were abolished by the bile diversion. Measurements of bile acids in the fasting gastric aspirate were useful in predicting the outcome of surgery; good results were obtained when initially there was reflux into the stomach of more than 120 µmol/hr of bile acids. A wider group of patients than those selected in previous series may benefit from this operation, as good results can be obtained in patients with dyspepsia relieved by alkali and without achlorhydria or gastritis. Endoscopy was repeated 1 yr after Roux-en-Y opera-

tion. Erythema of the mucosa was improved, but gastritis did not improve.

5480 PRIMARY HYPERPARATHYROIDISM AND PEPTIC ULCER DISEASE. (Eng.) Linos, D. A.; van Heerden, J. A.; Abboud, C. F.; Edis, A. J. (Mayo Clinic, 200 First St., SW, Rochester, MN 55901). *Arch. Surg.* 113(4):384-386; 1978.

To determine whether primary hyperparathyroidism is related to peptic ulcer disease, 46 cases of concomitant primary hyperparathyroidism and peptic ulcer disease were evaluated. Among these patients, there was no sex preponderance. The pathologic findings at parathyroid surgery, as well as the features of peptic ulcer disease, were the same as in patients with primary hyperparathyroidism or with peptic ulcer disease alone. The ulcer symptoms of 58% of the patients with adequate follow-up improved after parathyroidectomy. Sixty-six percent of the patients who had active peptic ulcer disease at surgery improved as compared with only 44% of the patients who had complicated peptic ulcer disease. None of the factors studied (age, sex, serum calcium and serum parathyroid hormone levels, location and duration of ulcer) had any effect on the peptic ulcer symptoms after parathyroidectomy. These results and a critical review of the experimental and clinical literature suggest that the association between primary hyperparathyroidism and peptic ulcer disease is no more than coincidental.

5481 pH THRESHOLD FOR RELEASE OF SECRETIN IN NORMAL SUBJECTS AND IN PATIENTS WITH DUODENAL ULCER AND PATIENTS WITH CHRONIC PANCREATITIS. (Eng.) Fahrenkrug, J.; Schaffalitzky de Muckadell, O. B.; Rune, S. J. (Bispebjerg Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 13(2):177-186; 1978.

The pH threshold of secretin release was examined in seven normal controls (C), nine duodenal ulcer (DU) patients, and four patients with chronic pancreatitis (CP) to determine whether this pH threshold is too low to allow a role for secretin in the normal postprandial neutralization in the duodenum. The duodenum was perfused with isotonic citrate buffers (pH 4, 3, 2, or 1) at an infusion rate of 52 ml/min for 20 min and a resting period of 20 min between infusions. Using ^{51}Cr-EDTA as a volume marker for the citrate buffers, the disappearance rate of acid from the duodenum was calculated from the difference in pH between the infused buffer and the aspirated duodenal contents. Venous blood samples were taken every 10 min for secretin determination by radioimmunoassay. The plasma secretin concentration was <3 pM at pH 4 and 3. Perfusion at pH 2 caused a small but statistically significant ($p<0.01$) increase in the secretin concentration to 4 pM, and it rose to 12 pM at pH 1; no significant difference was found between these three groups. The disappearance rate of acid from the duodenum was the same for the controls and the patients at pH 4 and 3, while it was significantly lower ($p<0.05$) at pH 2 and 1 in the patients with CP. In all groups, the disappearance rate rose with increasing acidity of the buffer. There were strong correlations between the disappearance rate of acid from the duodenum and the plasma secretin concentration in all groups ($r=0.88$ for C, $r=0.54$ for DU, and $r=0.87$ for CP). These results demonstrate that the pH threshold for secretin release is between pH 2 and 3, with no difference between normal subjects and patients with DU or CP.

5482 RESULTS OF SYMPTOMATIC FOLLOW-UP BASED UPON ENDOSCOPIC AND BIOPTIC CONTROLS 5 TO 10 YEARS AFTER BI AND BII-RESECTION [Abstract]. (Eng.) Kliems, G.; Paquet, K. J.; Miederer, S. E.; Kutz, K. (Surgical Clinic, Univ. Bonn, Venusberg, W. Germany). *Endoscopy* 9(2):116; 1977.

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(RAF Hosp., Nocton Hall, Lincoln, England). *Br. Med. J.* 2(6095):1123; 1977.

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5501 PNEUMOPERITONEUM IN PERFORATED DUODENAL ULCER DISEASE--A FURTHER LOOK. (Eng.) Lee, P. W. R.; Costen, P. D. M.; Wilson, D. H.; Halsall, A. K. (General Infirmary, Leeds 1, Yorkshire, England). *Br. J. Clin. Pract.* 31(7/8):108, 110; 1977.

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5503 PEPTIC ULCERATION OF THE LEFT ATRIUM. (Eng.) Scott, A.; Garland, C.; Gillespie, G. (Victoria Infirmary, Glasgow, Scotland). *J. R. Coll. Surg. Edinb.* 22(5):331-332; 1977.

See also, 5076, 5127, 5343, 5354, 5391, 5397, 5407, 5410, 5419, 5429, 5434, 5435, 5453, 5457, 5458, 5459, 5465, 5522, 5623, 5744, 5773, 5775, 5781, 5782.

SMALL INTESTINE

5504 RADIONUCLIDE IMAGING OF MECKEL'S DIVERTICULUM IN CHILDREN. (Eng.) Gelfand, M. J.; Silberstein, E. B.; Cox, J. (Cincinnati General Hosp., Cincinnati, OH 45267). *Clin. Nucl. Med.* 3(1):4-8; 1978.

Experience with radionuclide imaging in the diagnosis of Meckel's diverticulum is presented. Fifty-eight children were studied for the presence of Meckel's diverticulum by scintigraphy with ^{99m}Tc-pertechnetate. Meckel's diverticulum was found at surgery in all of 6 patients with positive radionuclide studies and in 2 of 48 patients with negative studies. Four studies could not be interpreted

because of widespread intestinal activity. False-positive readings did not occur. Radionuclide imaging with sodium pertechnetate has proved valuable in the diagnosis of Meckel's diverticulum.

5505 SELECTIVE IgA DEFICIENCY ASSOCIATED WITH TOTAL VILLOUS ATROPHY OF THE SMALL INTESTINE AND AN ORGAN-SPECIFIC ANTI-EPITHELIAL CELL ANTIBODY. (Eng.) McCarthy, D. M.; Katz, S. I.; Gazze, L.; Waldmann, T. A.; Nelson, D. L.; Strober, W. (Natl. Cancer Inst., Bethesda, MD 20014). *J. Immunol.* 120(3):932-938; 1978.

The case of a patient with total villous atrophy of the small intestine, associated with selective IgA deficiency, is presented. The patient, a 14-yr-old boy, presented after an acute febrile illness. A gluten-free diet and other standard treatments were without benefit. Studies revealed that T cell function, serum antibody production, delayed hypersensitivity, mixed leukocyte reaction, antibody-dependent and cell-mediated cellular cytotoxicities, and general immune responsiveness seemed intact. However, IgA could not be detected in serum, tissues, or external secretions and, cultured with pokeweed mitogen, the patient's B cells failed to produce IgA. In addition, the patient's cells suppressed IgA production by control cells cocultured in the presence of mitogen. Indirect immunofluorescent studies revealed in his serum an IgG class organ-specific antibody that bound to villus cells in control intestine, obtained from normal and diseased subjects, but not to cells in the patient's diseased mucosa. After low dose cyclophosphamide therapy, IgA remained absent but suppressor activity disappeared, intestinal villi regenerated fully, cellular cytotoxicity was reduced, and the serum antibody titer slowly declined. The antibody bound strikingly to mature cells in the patient's regenerated villi, on indirect but not direct immunofluorescence. These unique findings suggest an autoimmune etiology. No such antibodies were found in other IgA-deficient subjects.

5506 CHARACTERIZATION OF THE IgA IMMUNOCYTE POPULATION AND ITS PRODUCT IN A PATIENT WITH EXCESSIVE INTESTINAL FORMATION OF IgA. (Eng.) Brandtzaeg, P.; Baklien, K. (Rikshospitalet, Oslo 1, Norway). *Clin. Exp. Immunol.* 30(1):77-88; 1977.

The case of an 11-yr-old boy with the clinical features of α-chain disease, but whose intestinal immunocytes produced a high level of IgA, is presented. His cell population and IgA production were studied extensively. The patient presented with features indicative of celiac or α-chain disease (growth retardation and malabsorption). However, his major serum component (about 50 mg/ml) was found to be a polyclonal, polymeric (about 80% dimeric) IgA consisting mainly of the subclass IgA_1 and showing a κ:λ ratio of 67:33. Also, the serum concentration of IgA monomers was increased (to about 9 mg/ml). The polymers were heterogeneous with regard to J-chain content--varying on a molar basis from 1.9 for the more basic fraction to at least 2.4 for the more acidic one. Both fractions showed noncovalent affinity for secretory component (SC) *in vitro*. Most of the serum IgA seemed to originate from the small intestine, which contained a fivefold increased population of IgA immunocytes. These cells were heterogeneous with regard to production of polymeric IgA; many of them showed definitely more J-chain synthesis than did normal intestinal IgA immunocytes. The cell population had apparently not spread to the bone marrow, but the polymeric IgA product permeated the connective tissue throughout the body and appeared also in the urine, partly associated with SC. Such an excessively proliferating intestinal B-cell population may bear some relation to α-chain disease.

5507 NON-OCCLUSIVE INTESTINAL INFARCTION. (Eng.) Watt-Boolsen, S. (Glostrup Hosp., Copenhagen, Denmark). *Acta Chir. Scand.* 143(6):365-369; 1977.

The frequency, outcome, and conditions associated with nonocclusive intestinal infarction were studied retrospectively in 23 patients. In 15 patients, the infarction was associated with cardiac disease and its treatment. In two patients it was associated with septic and hemorrhagic shock, and in four patients with other diseases. Two patients were healthy, when the symptoms of obstruction began. The course was fatal in 20 patients. It is concluded that nonocclusive intestinal infarction occurs often enough to be taken into consideration whenever nonmechanical intestinal infarction is suspected. The treatment should be directed to the conditions causing intestinal ischemia.

5508 HEPATIC COLLAGEN PROLINE HYDROXYLASE ACTIVITY IN HEPATIC DISEASE FOLLOWING JEJUNOILEAL BYPASS FOR MORBID OBESITY. (Eng.) Mezey, E.; Imbembo, A. L. (Baltimore City Hosp., 4940 Eastern Ave., Baltimore, MD 21224). *Surgery* 83(3):345-353; 1978.

The hepatic activity of collagen proline hydroxylase was determined in the operative and follow-up liver biopsies of patients who underwent jejunoileal bypass for morbid obesity to determine whether changes in the activity of this enzyme correlate with and/or are of predictive value in the development of hepatocellular necrosis and fibrosis. The mean enzyme activity in the operative biopsies of 14 patients was 90.3 ± 28.51 disintegrations/min (dpm)/mg protein/min, which was similar to the activity of 80.0 ± 13.01 dpm/mg of protein/min found in the percutaneous liver biopsies of 12 nonobese controls. Hepatocellular necrosis developed in 3 of the 10 patients followed after jejunoileal bypass. The necrosis was indistinguishable from alcoholic hepatitis in two and focal in one. The hepatic activity of collagen proline hydroxylase increased to a value higher than the mean normal value plus 2 standard deviations (>170 dpm/mg of protein/min) only in the three patients who developed hepatocellular necrosis. Takedown of the bypass in the two patients with the histological picture resembling alcoholic hepatitis resulted in

disappearance of the necrosis and in a fall in the enzyme activity to the normal range. The patient with focal necrosis was not operated on but was followed and developed hepatic failure rather suddenly and died. This study shows that increases in the activity of hepatic collagen proline hydroxylase following jejunoileal bypass occur in association with hepatocellular necrosis and indicate severe liver damage, regardless of how mild or severe the hepatocellular necrosis appears to be on histological examination.

5509 BACTERIAL FLORA OF THE SMALL BOWEL BEFORE AND AFTER BYPASS PROCEDURE FOR MORBID OBESITY. (Eng.) Corrodi, P.; Wideman, P. A.; Sutter, V. L.; Drenick, E. J.; Passaro, E., Jr.; Finegold, S. M. (Kantonsspital, CH-8091 Zurich, Switzerland). *J. Infect. Dis.* 137(1):1-6; 1978.

The contents of the proximal jejunum and distal ileum were cultured quantitatively in eight patients who were undergoing intestinal bypass procedure for obesity to determine whether bacterial colonization plays a role in the pathogenesis of side-effects seen after this type of surgery. Five jejunal specimens were sterile, and three contained low counts of a predominantly aerobic flora. Ileal contents yielded variable but usually higher counts than in the jejunum, and there were similar numbers of anaerobes and aerobes. In three patients in whom a bypass was established, contents of the functioning small bowel showed counts of $10^{5.0}$–$10^{7.6}$ colony-forming U/ml. These counts exceeded the counts in the normal terminal ileum, and the flora qualitatively resembled that of feces. Four specimens from excluded loops revealed colonization with fecal organisms, and the counts ranged between $10^{6.4}$ and $10^{9.7}$ colony-forming U/ml. In jejunoileal bypass, both the functioning small bowel and the excluded loop become colonized with colonic flora, a phenomenon that may contribute to some of the side-effects of this procedure.

5510 ZINC AND COPPER STATUS IN YOUNG PATIENTS FOLLOWING JEJUNOILEAL BYPASS. (Eng.) Faber, J.; Randolph, J. G.; Ribbins, S.; Smith, J. C. (Dept. Surgery, George Washington Univ., Washington, DC). *J. Surg. Res.* 24(2):83-86; 1978.

To determine whether zinc and copper malabsorption occurs after jejunoileal bypass, zinc and copper nutrition was investigated in eight young subjects (aged 11-19 yr) at the time of surgery. This study was performed an average of 30 months following the operations. Weight loss averaged 43%. However, all patients had stabilized in weight prior to the study, and supplementary potassium or calcium was no longer required. Except for one patient who had the Prader-Willi syndrome, all were free of medical problems other than obesity. Six of the eight subjects had low serum zinc concentrations. In addition, five of the eight had subnormal serum copper concentrations. The data suggest apparent malabsorption of zinc and copper resulting in depressed serum concentrations of these trace elements. Therefore, supplementation may be beneficial, especially if the operation is performed on children before the completion of growth and sexual maturation.

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5514 THE PRESENT STATE OF SMALL BOWEL TRANSPLANTATION IN ANIMAL RESEARCH AND IN MAN. (Eng.) Stauffer, U. G. (Universitats-Kinderklinik, Zurich, Switzerland). *Z. Kinderchir.* 22(3):241-248; 1977.

5515 ULCERATIVE PSEUDOPOLYPOSIS MIMICKING NEOPLASM PROXIMAL TO A JEJUNAL OBSTRUCTION. (Eng.) Eisenberg, R. L.; Hedgcock, M. W.; Jeffrey, R. B.; Montgomery, C. K. (Veterans Admin. Hosp., 4150 Clement St., San Francisco, CA 94121). *Am. J. Roentgenol.* 129(3):503-505; 1977.

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5517 SEXUAL PROBLEMS AMONG MARRIED ILEOSTOMISTS: SURVEY CONDUCTED BY THE ILEOSTOMY ASSOCIATION OF GREAT BRITAIN AND IRELAND. (Eng.) Burnham, W. R.; Lennard-Jones, J. E.; Brooke, B. N. (St. Mark's Hosp., City Rd., London EC1, England). *Gut* 18(8):673-677; 1977.

5518 THE RELATION BETWEEN ILEAL RESECTION AND VITAMIN B_{12} ABSORPTION. (Eng.) Thompson, W. G.; Wrathell, E. (Ottawa Civic Hosp., 1053 Carling Ave., Ottawa, Ontario K1Y 4E9, Canada). *Can. J. Surg.* 20(5):461-464; 1977.

5519 DIAMOND-SHAPED ANASTOMOSIS FOR CONGENITAL DUODENAL OBSTRUCTION. (Eng.) Kimura, K.; Tsugawa, C.; Ogawa, K.; Matsumoto, Y.; Yamamoto, T.;

Asada, S. (Kobe Children's Hosp., 1-1-1, Takakuradai, Samaku, Kobe 654, Japan). *Arch. Surg.* 112(10):1262-1263; 1977.

5520 ONSET OF TUBERCULOSIS AFTER INTESTINAL BYPASS SURGERY FOR OBESITY: GUIDELINES FOR EVALUATION, DRUG PROPHYLAXIS, AND TREATMENT. (Eng.) Yu, V. L. (Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA 15261). *Arch. Surg.* 112(10):1235-1237; 1977.

5521 STENOSIS OF THE SMALL INTESTINE DUE TO NONOCCLUSIVE ISCHEMIC DISEASE. (Eng.) Thaker, P.; Weingarten, L.; Friedman, I. H. (Beth Israel Medical Center, New York, NY). *Arch. Surg.* 112(10):1216-1217; 1977.

5522 POSTGASTRECTOMY AFFERENT LOOP OBSTRUCTION DUE TO EFFERENT LOOP HERNIATION. (Eng.) Hakami, M.; Ahmadzadeh, M.; Hakami, F. (Univ. Isfahan, Sch. Medicine, Isfahan, Iran). *Abdom. Surg.* 19(9):202-203; 1977.

5523 INVESTIGATION OF RESERVE FUNCTIONAL ABILITY OF SMALL INTESTINE BY XYLOSE TEST AFTER FOOD LOADING. (Eng.) Frolkis, A. V.; Bushkova, R. (Dept. Internal Medicine, Kuusinen Univ., Petrozavodsk, Lenina 33, USSR). *Acta Hepatogastroenterol. (Stuttg.)* 24(4):266-270; 1977.

5524 PNEUMATOSIS INTESTINALIS AS A COMPLICATION OF JEJUNOILEAL BYPASS. (Eng.) Wandtke, J.; Skucas, J.; Spataro, R.; Bruneau, R. J. (Rochester General Hosp., Rochester, NY 14642). *Am. J. Roentgenol.* 129(4):601-604; 1977.

5525 CAVITATING METASTASES OF THE SMALL INTESTINE. (Eng.) Zornoza, J.; Goldstein, H. M. (M.D. Anderson Hosp. and Tumor Inst., Houston, TX 77030). *Am. J. Roentgenol.* 129(4):613-615; 1977.

5526 LACTIC DEHYDROGENASE ISOENZYMES IN THE GASTRIC AND COLONIC MUCOSA: THEIR CLINICAL RELEVANCE. (Spa.) Carda Abella, P. (Facultad de Medicina, Universidad Complutense, Madrid, Spain). *Rev. Esp. Oncol.* 23(1):13-82; 1976.

5527 SMALL INTESTINE NEOPLASMS. (Pol.) Ancyparowicz, S.; Piotrowicz, W.; Kawalski, A. (Klinika Chirurgii Ogolnej CMKP, ul. Czerniakowska 231, 00-416 Warsaw, Poland). *Pol. Tyg. Lek.* 33(2):53-55; 1978.

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5529 CONSECUTIVE OCCURRENCE OF GANGLIOCYTIC PARAGANGLIOMA OF THE ASCENDING PART OF THE DUODENUM AND ADENOMA OF THE APPENDIX IN A PATIENT. (Fre.) Tissot, E.; Nogier, M.; Francillon, J. (Hopital Ed.-Herriot, 69374 Lyon Cedex 2, France). *Lyon Chir.* 73(5):378-380; 1977.

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5531 GARDNER'S SYNDROME AND TUMOR OF THE AMPULLA OF VATER: REPORT OF ONE CASE [Abstract]. (Fre.) Suzanne, J.; Gillet, M.; Miguet, J. P.; Camelot, G.; Carayon, P.; Gisselbrecht, H. (Service de Medecine 2, C.H.U. Besancon, Besancon, France). *Gastroenterol. Clin. Biol.* 1(10):834; 1977.

5532 HETEROTOPIC GASTRIC MUCOSA IN THE DUODENAL MUCOSA. (Ger.) Hofstetter, J. R.; Fontolliet, Ch.; Gonvers, J. J.; Ozzello, L.; Realini, S. (Policlinique Med. Univ., Lausanne, Switzerland). *Z. Gastroenterol.* 15(10):640-641; 1977.

5533 EVALUATION OF INTESTINAL BYPASS SURGERY FOR THE TREATMENT OF OBESITY. (Spa.) Rodriguez Montes, J. A.; Fernandez de Lis, S. (Ciudad Sanitaria "La Paz," Universidad Autonoma de Madrid, Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 51(4):465-480; 1977.

5534 LETTERS TO THE EDITOR REGARDING "ADIPOSITAS--THE VALUE OF BYPASS OPERATION" BY A. LABHART. (Fre./Ger.) Plattner, H. C.; Adler, R.; Labhart, A. (14, rue de Candolle, CH-1205 Geneva, Switzerland). *Schweiz. Med. Wochenschr.* 107 (29):1044-1047; 1977.

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5536 MECHANICAL OBSTRUCTION OF THE SMALL INTESTINE: REPORT OF 117 CASES. (Spa.) Mendoza, C. G.; Guerrero, J. A.; Magallo, J. A.; Camprodon, R. (Ciudad Sanitaria "Francisco Franco," de la Seguridad Social, Barcelona, Spain). *Rev. Esp. Enferm. Apar. Dig.* 51(4):391-404; 1977.

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J. (Eeuwfeestkliniek en St. Vincentiusziekenhuis, Antwerp, Belgium). *Tijdschr. Gastroenterol.* 20(1): 5-28; 1977.

5538 PATHOGENIC SUBSTANTIATION OF TREATMENT IN PARALYTIC INTESTINAL OBSTRUCTION IN CHILDREN. (Rus.) Isakov, Iu. F.; Stepanov, E. A.; Burkov, I. V.; Krasovskaia, T. V.; Shumov, N. D.; Smirnov, A. N.; Bodunkova, L. E. (Dept. Pediatric Surgery Orthopedics, N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Klin. Khir.* (6):1-6; 1977.

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5540 EXTENDED RESECTION OF THE STOMACH AND SMALL INTESTINE IN DUODENAL AND JEJUNAL POLYPOSIS. (Ger.) Pfitzmann, K. F. (Stadtisches Klinikum Berlin-Buch, II. Chirurgische Klinik, Zepernicker Strasse 1, DDR-1115 Berlin-Buch, E. Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 37(2): 79-83; 1977.

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SMALL INTESTINE

Malabsorption

5543 UNTREATED ACRODERMATITIS ENTEROPATHICA IN ADULTS. (Eng.) Olholm-Larsen, P. (Univ. Hosp., Odense, Denmark). *Dermatologica* 156 (3):155-166; 1978.

Six cases of untreated acrodermatitis enteropathica (AE) in surviving adults are reviewed from the literature and two additional cases are reported. In three of the cases from the literature, the symptoms disappeared at the onset of puberty, while in the rest, the disease had a fluctuating course with long symptom-free intervals and an uncharacteristic symptomatology. The two new cases are a brother and sister from a nonconsanguineous marriage, both with mild manifestations of AE. In the brother, only characteristic skin changes on the feet remained at adult age. His sister had both skin and intestinal symptoms that disappeared at adult age, but the skin manifestations reappeared with each pregnancy. The woman suffered from depression for long periods and developed signs of parkinsonism at a relatively young age (40 yr). Both patients had very low serum zinc levels, and complete remission of symptoms was effected by zinc sulfate administration, confirming that AE is a zinc deficiency syndrome. The parents and another brother had slightly lowered serum zinc levels, consistent with a heterozygous genotype for the autosomal recessive allele for AE. AE in adults may be underdiagnosed because of an uncharacteristic symptomatology; determination of serum zinc levels is essential to such a diagnosis.

5544 T AND B LYMPHOCYTES IN ALPHA-CHAIN DISEASE. (Eng.) Kharazmi, A.; Rezai, M. H.; Abadi, P.; Nasr, K.; Haghighi, P.; Haghshenas, M. (Medical Sch., Pahlavi Univ., Shiraz, Iran). *Br. J. Cancer* 37(1):48-54; 1978.

The possibility that abnormalities of the immune system exist in alpha-chain disease was investigated in 9 patients and 10 controls. The rosette technique and surface immunofluorescence were used to enumerate the circulating thymus-derived (T) and bone marrow-derived (B) lymphocytes. The proportion of circulating B lymphocytes was much higher in the patients (34%-64%) than in controls (average 26.2%), whereas that of the T lymphocytes was lower in the patients than in the controls (32%-60% versus 57%-72%, average 64.5%). The patients could not be sensitized to dinitrochlorobenzene, and their skin test to tuberculin was negative. Although the IgM and IgG levels in the patients were similar to those in controls, the IgA level was elevated in the patients compared with the controls (130-534 mg/100 ml, versus 122-298, average 199.5 mg/100 ml). It is concluded that alpha-chain disease is a B cell disease of the IgA type and is associated with a low level of cellular immunity.

5545 STRONG ASSOCIATION BETWEEN THE HLA-Dw3-RELATED B CELL ALLOANTIGEN -DRw3 AND COELIAC DISEASE. (Eng.) Ek, J.; Albrechtsen, D.;

Solheim, B. G.; Thorsby, E. (Natl. Hosp. Norway, Rikshospitalet, Oslo 1, Norway). *Scand. J. Gastroenterol.* 13(2):229-233; 1978.

To investigate the clinical value of B cell typing in patients with suspected celiac disease (CD), the frequency of histocompatibility locus antigens HLA-A, -B, -C, and -Dw3 and the associated B lymphocyte alloantigen -DRw3 was studied in 68 children with untreated CD and in healthy controls. Although no significant differences in the frequencies of other antigens between patients and controls were found, DRw3 occurred in a significantly greater number of patients than controls (95% versus 25%), and the relative risk was calculated to be 54. The high frequencies of HLA-A1, -B8, and -Dw3 in CD was confirmed. The high relative risk of CD that was associated with DRw3 suggests that B lymphocyte typing is valuable in the diagnosis of CD.

5546 IgA AND IgG RETICULIN ANTIBODIES IN COELIAC AND NON-COELIAC PATIENTS. (Eng.) Eade, O. E.; Lloyd, R. S.; Lang, C.; Wright, R. (Southampton Univ. Hosp., Southampton, England). *Gut* 18(12):991-993; 1977.

Using indirect immunofluorescence, comparisons were made of patterns of staining of five tissue substrates with 28 R1 reticulin antibody-positive celiac sera, and 23 R1 reticulin antibody-positive nonceliac sera. IgA and IgG fluorescein conjugates were used separately. IgA antibodies were seen in 22 celiac patients compared with 3 nonceliac patients. Concomitant sinusoidal fluorescence (RS pattern) was seen more frequently with the nonceliac (60.9%) than with celiac sera (10.7%). Such differences may help to distinguish those patients who should have a jejunal biopsy when using the reticulin antibody as a screening test for celiac disease.

5547 COMPLEMENT SYSTEM STUDIES IN ADULT COELIAC DISEASE. (Eng.) Teisberg, P.; Fausa, O.; Baklien, K.; Akesson, I. (Ulleval Hosp., Oslo 1, Norway). *Scand. J. Gastroenterol.* 12(7): 873-876; 1977.

To clarify the mechanism of gluten damage to the intestinal mucosa in celiac disease, detailed complement system studies were carried out in 22 patients with adult celiac disease. Activation products of C3 were observed in the fresh sera of all untreated patients, while only four had activation products of factor B of the alternate pathway. C4 and C3 levels were lower than normal mean, but only the depression of C4 reached a level of statistical significance ($p<0.05$). The amounts of circulating C3 activation products were significantly reduced when the patients were on a gluten-free diet ($p<0.05$). The results suggest that activation of the classical pathway of the complement system takes place in adult celiac disease, and that there is an association between gluten ingestion and complement activity. A possible mechanism of tissue injury in this disease may be activation of complement factors by a humoral immune reaction to dietary gluten in the intestinal wall.

5548 ABSORPTION OF INORGANIC AND HAEMOGLOBIN IRON IN COELIAC DISEASE. (Eng.) Anand, B. S.; Callender, S. T.; Warner, G. T. (Radcliffe Infirmary, Oxford OX2 6HE, England). *Br. J. Haematol.* 37(3):409-414; 1977.

To clarify the nature of iron absorption and iron deficiency in celiac disease, absorption of a 5-mg dose of iron as Fe^{++} or hemoglobin iron was studied using a total body counter in 131 control, 34 untreated patients with celiac disease, and 33 patients with celiac disease on a gluten-free diet. In both patients and controls, the majority of subjects were iron deficient. Thirteen control subjects, 13 patients with untreated celiac disease, and 14 on a gluten-free diet had both absorption tests. Fe^{++} absorption was reduced in patients with untreated celiac disease who were not iron-deficient (8.0% versus 19.3 in treated celiac patients and 14.9% in controls) and in anemic celiac patients (18.7% in treated patients and 45.4% in controls). These results show that Fe^{++} absorption is affected by celiac disease and is improved by a gluten-free diet. Absorption was improved on treatment with gluten-free diet. In contrast, the absorption of hemoglobin iron was not affected in celiac disease, indicating that the absorption of iron in this form is not dependent on the integrity of the mucosa of the proximal small bowel.

5549 GLUTEN-FREE DIET IN DERMATITIS HERPETIFORMIS. II. MORPHOLOGICAL AND IMMUNOLOGICAL FINDINGS IN THE SKIN AND SMALL INTESTINE OF 12 PATIENTS AND MATCHED CONTROLS. (Eng.) Reunala, T. (Univ. Central Hosp., Snellmaninkatu 14, SF-00170 Helsinki 17, Finland). *Br. J. Dermatol.* 98(1):69-78; 1978.

To assess the importance of immunological factors in dermitiis herpetiformis, the skin and small intestine of 12 patients with dermatitis herpetiformis whose skin condition responded to a gluten-free diet (GFD) were re-examined morphologically and immunologically after diet treatment. The findings were compared with those in 12 matched patients on a normal diet. Jejunal histology revealed morphological improvement in every patient on a GFD, whereas all patients on a normal diet continued to have villous atrophy. Intraepithelial lymphocyte counts were normal in eight patients on a GFD in contrast to one on a normal diet. Immunofluorescence examination of the jejunal mucosa revealed that the numbers of cells containing IgA and IgM were increased significantly in the normal diet group ($p<0.001$ for IgA, $p<0.05$ for IgM). The values were lower in the GFD group but these also exceeded the values in the controls. IgA deposits were found in the uninvolved skin of every patient irrespective of the diet treatment, but the fluorescence seemed to be less intense in patients on a GFD. A clear difference was found in the occurrence

of complement component C_3 deposits in the uninvolve skin. Three patients on a GFD had C_3 deposits; two of these did not follow a strict diet. However, C_3 was found in eight patients on a normal diet. Circulating dietary and autoantibodies were found in two patients on a GFD and in nine on a normal diet. Serum immunoglobulin (IgG, IgA, IgM) and complement (C_3, C_4) levels were within normal limits in both patient groups.

5550 ANTIBODIES TO GLUTEN AND RETICULIN IN GASTROINTESTINAL DISEASES. (Eng.) Eterman, K.P.; Feltkamp, T. E. W. (Netherlands Red Cross Blood Transfusion Service, P.O. Box 9190, Amsterdam, Netherlands). *Clin. Exp. Immunol.* 31(1):92-99; 1978.

Frequencies and immunoglobulin classes of antibodies to reticulin (Rab) and to gluten (Gab) in relation to the diet were studied in patients with celiac disease, dermatitis herpetiformis, Crohn's disease, ulcerative colitis, cystic fibrosis, and miscellaneous diseases leading to recurrent diarrhea. In addition, the sera of some celiac patients and of patients with dermatitis herpetiformis were examined for the presence of autoantibodies to smooth muscle, skeletal muscle, thyroid, gastric parietal cells, adrenocortex, salivary duct cells, nuclei, and mitochondria. Rab were found in 33% of 14 celiac patients on a normal diet. These antibodies were found in only 10% of six celiac patients on a gluten-free diet. In 34 patients with dermatitis herpetiformis, 12% had these antibodies, whereas the highest frequency in the other diseases studied was 7% (compared to 2% in healthy controls). Antibodies to gluten, demonstrated with the immunofluorescence technique, were found in all celiac children on a normal diet that were studied, and in half of the adults with the untreated disease. In children and adults on a gluten-free diet, these frequencies decreased to 87% amd 32%, resp. In Crohn's disease, cystic fibrosis, recurrent diarrhea, dermatitis herpetiformis, and ulcerative colitis, the frequencies were 52%, 42%, 37%, 18%, and 18%, resp. (compared with 4% in controls). It is concluded that Gab are sensitive markers for gastrointestinal diseases, but are not specific for gluten enteropathy. Rab, on the other hand, are less sensitive but of far greater specificity for celiac disease. Gab were of the IgA, IgM, and IgG classes, whereas Rab were only of the IgA and IgG classes. Both types of antibody were found to be noncomplement-fixing. Autoantibodies to smooth muscle were found in 5% of the celiac patients compared with 0% of controls. No relationship with hepatic complications was found. In the patients with dermatitis herpetiformis, autoantibodies to gastric parietal cells were found in 24% compared with 5% of controls. No relationship was established between the occurrence of histocompatibility locus antigen B8 and the presence or absence of any of the antibodies studied.

5551 INTESTINAL FUNCTION IN INFANTS WITH SEVERE CONGENITAL HEART DISEASE. (Eng.) Sondheimer, J. M.; Hamilton, J. R. (Hosp. for Sick Children, 555 University Ave., Toronto, Ontario M5G 1X8, Canada). *J. Pediatr.* 94(2):572-578; 1978.

Digestive tract function was evaluated in 21 young infants with severe congenital heart disease. Nine infants had congestive heart failure and ventricular septal defect or single ventricle, and the others had cyanosis and transposition of the great arteries. Enteric protein loss was excessive in eight patients, and steatorrhea was found in five. These abnormalities were mild and not related to the type or severity of the cardiac lesion. This study suggests that, in designing dietary regimens for these patients, their potential for defective gastrointestinal function must be considered. Because no consistent pattern of abnormalities is apparent, each patient who fails to thrive may deserve gastroenterologic evaluation.

5552 EVIDENCE FOR EXCESSIVE ABSORPTION OF OXALATE BY THE COLON IN ENTERIC HYPEROXALURIA. (Eng.) Modigliani, R.; Labayle, D.; Aymes, C.; Denvil, R. (Hopital Saint Lazare, 107 rue de Faubourg St. Denis 75010 Paris, France). *Scand. J. Gastroenterol.* 13(2):187-192; 1978.

The site of oxalate hyperabsorption in malabsorption syndromes and the role of the colon in enteric hyperoxaluria were investigated in 27 patients with steatorrhea secondary to ileal resection (IR) and in 38 controls. The mean urinary oxalate excretion was high in 13 patients with IR and intact colon and in 9 subjects with IR and right hemicolectomy (90.2 ± 11.9 and 108 ± 18.6 mg/24 hr, resp.), whereas it was normal in 5 patients with IR and ileostomy (21.9 ± 4.4 mg/24 hr). In one patient in the last group in whom the colon had not been removed initially but excluded, closure of the ileostomy resulted in the development of frank hyperoxaluria. Intracolonic perfusion of calcium (1.93 g/day) abolished or greatly reduced the hyperoxaluria in three patients. These results indicate that the colon is the major site of oxalate hyperabsorption, and that the right colon is not necessary for the development of hyperoxaluria in malabsorption syndromes.

5553 RESPIRATORY HYDROGEN EXCRETION AS A PARAMETER FOR LACTOSE MALABSORPTION IN CHILDREN. (Eng.) Fernandes, J.; Vos, C. E.; Douwes, A. C.; Slotema, E.; Degenhart, H. J. (Erasmus Univ. Sophia Children's Hosp., Gordelweg 160, Rotterdam, Netherlands). *Am. J. Clin. Nutr.* 31(4):597-602; 1978.

Respiratory hydrogen excretion as a parameter of lactose malabsorption was investigated during tolerance tests with lactose, glucose plus galactose, and skim milk in 52 children, 4 to 15 yr of age. Ten children appeared to be lactose malabsorbers, as reflected by increased respiratory hydrogen excretion after the administration of lactose (2 g/kg, maximum 50 g). Skim milk, equivalent to 0.5 g lactose/kg, was administered to all lactose malabsorbers. Eight children were tolerant and

two children were "intolerant" for this physiological amount of lactose when administered as skim milk. Disaccharidase activities of jejunal biopsies were determined in all 10 children with lactose malabsorption. Lactase activity was deficient in nine children and normal in one child. The increase of blood glucose during the lactose tolerance test reflected lactose malabsorption less accurately than did the respiratory hydrogen excretion.

5554 SPECIFIC ANTIBODIES IN INFANTS WITH GASTROINTESTINAL INTOLERANCE TO COW'S MILK PROTEIN. (Eng.) Fallstrom, S. P.; Ahlstedt, S.; Hanson, L. A. (Inst. Medical Microbiology of the Univ., Guldhedsgatan 10, S-413 46 Goteborg, Sweden). *Int. Arch. Allergy Appl. Immunol.* 56(2):97-105; 1978.

Antibodies of various immunoglobulin classes against cow's milk proteins were studied in 16 infants and children with cow's milk protein intolerance, 8 with gluten-sensitive enteropathy, and 7 with acute gastroenteritis. Their IgE, IgG, IgM, and IgA levels, determined with the enzyme-linked immunosorbent assay (ELISA), and their IgE antibodies, determined with the radioallergo-sorbent test, were compared with those of reference groups of children (n=15) and adults (n=5). IgE, IgG, or IgA antibodies against unseparated cow's milk proteins, α-lactalbumin, β-lactoglobulin, α-casein, and β-casein were present in many of the studied samples, but did not discriminate between the individuals with and without intolerance symptoms. As a group, the infants with late reactions to cow's milk showed increased levels of IgE and IgC antibodies detected with the ELISA ($p<0.05$), while patients with gluten-sensitive enteropathy had significantly increased levels of IgG and IgA antibodies to cow's milk proteins compared to the reference group ($p<0.05$). By combining the findings of antibody increases in various immunoglobulin classes, an individual discrimination could be reached. Thus, 8 or 9 of the patients with late reactions to cow's milk had increased levels of IgE or IgG plus IgA antibodies as compared to 3 of 22 in the reference or acute gastroenteritis groups. Serodiagnosis with the ELISA may, therefore, be of some use in patients with a suspicion of cow's milk protein intolerance.

5555 ASSOCIATION OF CONGENITAL HYPOALDOSTERONISM AND STEATORRHEA. (Fre.) Loeuille, G.; Razemon-Pinta, M.; Lefebvre, J.; Racadot, A.; Farriaux, J. P.; Fontaine, G. (CHU Lille, Cite Hospitaliere, 59000 Lille, France). *Sem. Hop. Paris* 53(33):665-672; 1977.

The case of a 7-month-old female infant with severe failure to thrive is presented. A family history revealed the consanguinity of the parents (first cousins) and the death of a sister at 9 months of similar symptoms. The child weighed 3,980 g (birth weight was 3,400 g); there was hepatomegaly, excessive sudation, and a severe, intermittent steatorrhea (daily stools were 1% of body weight). The blood and urine levels of aldosterone were very low, the deficiency probably involving 18-hydroxylase activity and leading to hyponatremia, hyperkalemia, and metabolic acidosis. A diet free of gluten, milk proteins, and lactose, and including substitution by medium chain triglycerides did not improve the patient's condition, but treatment with NaCl (2-3 g/day) and 9-alpha-fluorohydrocortisone resulted in a rapid weight gain (600 g/10 days) and normalization of the blood picture. The baby died suddenly, however, of a bronchopneumonia with high fever. The authors emphasize the vulnerability of infants with hypoaldosteronism to any stress and the unusual severity of this case, which was complicated by severe malabsorption.

5556 WHIPPLE'S DISEASE IN A FEMALE WITH IMPAIRED CELL-MEDIATED IMMUNITY UNRESPONSIVE TO CO-TRIMOXAZOLE AND LEVAMISOLE THERAPY. (Eng.) Haeney, M. R.; Ross, I. N. (East Birmingham Hosp., Bordesley Green East, Birmingham B9 5ST, England). *Postgrad. Med. J.* 54(627):45-50; 1978.

The case of a 54-yr-old woman with Whipple's disease and impaired cell-mediated immunity is presented. Malabsorption of iron, vitamin B_{12}, folic acid, and fat was present. These abnormalities reverted to normal after the introduction of co-trimoxazole therapy. The patient's humoral immune system was normal, in contrast to impairment of cell-mediated immunity, which has not improved in spite of co-trimoxazole treatment for 2 yr and a therapeutic trial of levamisole (150 mg x 2/week 2 months, followed by 150 mg/day for 2 months). These findings are further evidence that there may be a primary immune deficiency in patients with Whipple's disease.

5557 SMALL BOWEL FUNCTION IN LACTASE DEFICIENCY [Abstract]. (Eng.) Debongnie, J. C.; Newcomer, A. D.; Phillips, S. F. (Mayo Clinic, Rochester, MN 55901). *Gastroenterology* 72(5, Part 2):1046; 1977.

5558 SERUM LIPIDS AND PROTEINS IN LACTOSE MALABSORPTION. (Eng.) Sahi, T.; Jussila, J.; Penttila, I. M.; Sarna, S.; Isokoski, M. (Harvard Sch. Public Health, 677 Huntington Ave., Boston, MA 02115). *Am. J. Clin. Nutr.* 30(4):476-481; 1977.

5559 ENURESIS TREATED WITH A MILK-FREE DIET [Abstract]. (Eng.) Tudor, R. B. (Quain and Ramstead Clinic, Bismarck, ND). *Gastroenterology* 72(5, Part 2):1142; 1977.

5560 INTESTINAL DISACCHARIDASE ACTIVITIES IN RELATION TO AGE [Abstract]. (Eng.) Welsh, J. D.; Poley, J. R.; Bhatia, M.; Stevenson, D. (Univ. Oklahoma Health Sciences Center, Oklahoma City, OK). *Gastroenterology* 72(5, Part 2):1148; 1977.

5561 PROTEIN-LOSING ENTEROPATHY COMPLICATING THE MUSTARD PROCEDURE. (Eng.) Krueger,

S. K.; Burney, D. W.; Ferlic, R. M. (Bishop Clarkson Memorial Hosp. Omaha, NB). *Surgery* 81(3):305-306; 1977.

5562 SERUM 25-HYDROXYVITAMIN D (25-OH-D) AND THE PATHOGENESIS OF OSTEOMALCIA IN PATIENTS WITH NON-TROPICAL SPRUE (NTS) [Abstract]. (Eng.) Arnaud, S. B.; Newcomer, A. D.; Hodgson, S. F.; Jowsey, J. O.; Go, V. L. W. (Mayo Clinic, Rochester, MN 55901). *Gastroenterology* 72(5, Part 2):1025; 1977.

5563 INTESTINAL CALCIUM BINDING PROTEIN (CaBP) IN NORMAL AND UREMIC MAN [Abstract]. (Eng.) Gleason, W. A.; Grimme, N.; Avioli, L. V.; Alpers, D. H. (Washington Univ. Sch. Medicine, St. Louis, MO). *Gastroenterology* 72(5, Part 2): 1063; 1977.

5564 A XYLOSE ABSORPTION TEST EMPLOYING BREATH ANALYSIS TECHNIQUES [Abstract]. (Eng.) Lahr, C. (Univ. Chicago, Pritzker Sch. Medicine, Chicago, IL). *Gastroenterology* 72(5, Part 2):1188; 1977.

5565 FOOD BOUND VITAMIN B_{12} MALABSORPTION--A CLINICALLY IMPORTANT CAUSE OF VITAMIN B_{12} DEFICIENCY [Abstract]. (Eng.) King, C.; Leibach, J.; Toskes, P. (Veterans Admin. Hosp., Gainesville, FL). *Gastroenterology* 72(5, Part 2):1080; 1977.

5566 WHIPPLE'S DISEASE. (Eng.) Leichtentritt, K. G. (Albert Einstein Coll. Medicine, New York, NY). *Am. J. Proctol.* 28(2):59-62; 1977.

See also, 5100, 5104, 5105, 5116, 5262, 5290, 5293, 5327, 5329, 5334, 5413, 5485, 5505, 5506, 5510, 5518, 5735, 5774, 5777.

LARGE INTESTINE

5567 DIAGNOSIS OF PSEUDOMEMBRANOUS COLITIS. (Eng.) Kappas, A.; Shinagawa, N.; Arabi, Y.; Thompson, H.; Burdon, D. W.; Dimock, F.; *et al.* (General Hosp., Birmingham, England). *Br. Med. J.* 1(611):675-678; 1978.

The clinical presentation and diagnostic features of pseudomembranous colitis are reviewed in 28 patients with histologically proved pseudomembranous colitis. All patients had received antibiotics, six for infections not requiring operations; the other cases all occurred after major surgery. All patients had diarrhea; six patients also had fever with clinical signs of sepsis, and three had abdominal pain thought to be due to anastomotic dehiscence after colonic resection. Pseudomembranous colitis was associated with WBC counts over 15,000 mm^3 in 17 patients and albumin concentrations of less than 30 g/l in 18. Pseudomembranous colitis was an incidental finding at necropsy in two of six patients who had not had an operation. Of the 22 patients who had had major surgery, 9 died from this complication; in all except two of these cases the diagnosis was made only at necropsy. If pseudomembranous colitis is suspected on clinical grounds or if there is an unexplained complication after colorectal surgery, repeat sigmoidoscopy and testing for fecal toxins should be carried out to establish the diagnosis.

5568 COLONIC HAUSTRAL PATTERN IN RELATION TO PRESSURE ACTIVITY AND PRESENCE OF DIVERTICULA. (Eng.) Weinreich, J.; Moller, S. H.; Andersen, D. (Dept. Surgical Gastroenterology, Aarhus Amtyssygehus, DK-8000 Aarhus C, Denmark). *Scand. J. Gastroenterol.* 12(7):857-864; 1977.

The correlation between the haustral pattern in the sigmoid colon and the pressure activity and presence of diverticula was examined in 184 patients with various colonic disorders (excluding major diseases such as ulcerative colitis or malignancies) by x-ray and sigmoid pressure measurement. No significant difference was found between the haustral patterns with respect to the presence or absence of an increased motility index. However, when the subgroup having an S-shaped haustral pattern was analyzed separately, an increased motility index was found with a significantly higher frequency (61%, $p<0.05$) than among patients with normal haustration (40%). Sigmoid diverticula as well as diverticulitis occurred with significantly higher frequencies ($p<0.05$) among patients with an increased haustral pattern than among patients with normal or decreased haustral patterns. It is concluded that an interpretation of colonic haustral pattern in terms of muscular activity is unwarranted.

5569 LEIOMYOSARCOMA OF THE RECTUM: RADICAL VS. CONSERVATIVE THERAPY AND REPORT OF THREE CASES. (Eng.) Labow, S. B.; Hoexter, B. (29 Barstow Rd., Great Neck, NY 11021). *Dis. Colon Rectum* 20(7):603-605; 1977.

5570 COLITIS CYSTICA PROFUNDA: REPORT OF A CASE IN WHICH DIFFERENTIATION FROM RECTAL CANCER WAS DIFFICULT. (Eng.) Nagasako, K.; Nakae, Y.; Kitao, Y.; Aoki, G. (Tokyo Women's Medical Coll., 10 Kawadacho, Shinjukuku, Tokyo, Japan). *Dis. Colon Rectum* 20(7):618-624; 1977.

5571 AN UNUSUAL COMPLICATION OF THE TEFLON-SLING REPAIR OF RECTAL PROLAPSE: REPORT OF A CASE. (Eng.) Goldman, S. L.; Fecteau, J. G.; Moore, D. B. (Veterans Admin. Hosp., 150 Muir Rd., Martinez, CA 94553). *Dis. Colon Rectum* 20(7):611-612; 1977.

5572 PROCIDENTIA OF THE RECTUM AFTER THE PULL-THROUGH OPERATION: AN UNUSUAL COMPLICATION AND REPORT OF TWO CASES. (Eng.) Ruiz, J. T. P.; Gennaro, A. R. (Brooklyn-Cumberland Medical Center, 121 Dekalb Ave., Brooklyn, NY 11201). *Dis. Colon Rectum* 20(7):608-610; 1977.

5573 MALIGNANT MELANOMA OF THE ANUS IN A NEGRO: REPORT OF A CASE AND REVIEW OF THE LITERATURE. (Eng.) Quinn, D.; Selah, C. (401 Lowell Drive, S.E., Huntsville, AL 35801). *Dis. Colon Rectum* 20(7):627-631; 1977.

5574 THIO-TEPA IN THE MANAGEMENT OF ANORECTAL CONDYLOMATA ACUMINATA: REPORT OF TWO CASES. (Eng.) Kerstein, M. D. (Michael Reese Hosp., 29th St. and Ellis Ave., Chicago, IL 60616). *Dis. Colon Rectum* 20(7):625-626; 1977.

5575 USE OF CHLORPROMAZINE IN THE TREATMENT OF ADYNAMIC ILEUS. (Eng.) Kinnaert, P.; Panda, M.; Deuvaert, F. (Hopital Universitaire Brugmann, Place Van Gehuchten 4, B-1020 Brussels, Belgium). *World J. Surg.* 1(5):655-660; 1977.

5576 ASSESSMENT OF COLONIC PERMEABILITY USING ^{14}C ERYTHRITOL FLUX [Abstract]. (Eng.) Keller, R. W. (Veterans Admin. Hosp., Salt Lake City, UT). *Gastroenterolgy* 72(5, Part 2):1079; 1977.

5577 REDUNDANT SIGMOID COLON AND CHRONIC IDIOPATHIC CONSTIPATION (CIC) [Abstract]. (Eng.) Pozzessere, C.; Corazziari, E.; Dani, S.; Fraracci, L.; Torsoli, A. (II Clinica Medica, Universita di Roma, Rome, Italy). *Gastroenterology* 72(5, Part 2):1113; 1977.

5578 EARLY DETECTION OF COLONIC CARCINOMA BY MASS SCREENING FOR OCCULT STOOL BLOOD: PRELIMINARY REPORT [Abstract]. (Eng.) Bond, J. H.; Gilbertsen, V. A. (Dept. Medicine, Univ. Minnesota, Minneapolis, MN). *Gastroenterology* 72(5, Part 2):1031; 1977.

5579 RESULTS OF A SCREENING PROGRAM FOR THE DETECTION OF EARLY COLON CANCER AND POLYPS USING FECAL OCCULT BLOOD TESTING [Abstract]. (Eng.) Winawer, S. J.; Leidner, S. D.; Miller, D. C.; Schottenfeld, D.; Befler, B.; Kurtz, R. C.; *et al.* (Memorial Sloan-Kettering Cancer Center, New York, NY). *Gastroenterology* 72(5, Part 2): 1150; 1977.

5580 EARLY COLON CANCER: A MEANINGFUL CONCEPT [Abstract]. (Eng.) Waye, J. D. (Mount Sinai Medical Sch., New York, NY). *Gastroenterology* 72(5, Part 2):1146; 1977.

5581 ^{3}H-THYMIDINE STUDIES IN INDIVIDUALS AT HIGH RISK FOR COLON CANCER [Abstract]. (Eng.) Deschner, E. E.; Long, F. C.; Winawer, S. J. (Memorial Sloan-Kettering Cancer Center, New York, NY). *Gastroenterology* 72(5, Part 2):1048; 1977.

5582 METABOLIC EPIDEMIOLOGY OF COLON CANCER: FECAL BILE ACIDS AND CHOLESTEROL METABOLITES OF PATIENTS WITH COLON CANCER, ADENOMATOUS POLYPS, FAMILIAL POLYPOSIS OR ULCERATIVE COLITIS [Abstract]. (Eng.) Reddy, B. S.; Weisburger, J. H.; Martin, C. W.; Hedges, A.; Wunder, E. L.; Lipkin, M. (American Health Foundation, Valhalla, NY). *Gastroenterology* 72(5, Part 2):1117; 1977.

5583 ALTERED GLYCOPROTEIN SYNTHESIS BY HUMAN COLONIC ADENOCARCINOMA [Abstract]. (Eng.) O'Gorman, T. A.; LaMont, J. T. (Peter Bent Brigham Hosp., Boston, MA 02115). *Gastroenterology* 72(5, Part 2):1109; 1977.

5584 HOMEOSTATIC CHANGES IN PATIENTS WITH COLONIC AND RECTAL CANCER. (Eng.) Jukhtin, V. I.; Chadaev, A. P.; Frolov, B. A.; Andrjukhin, I. M. (Second Moscow Medical Inst., Moscow, USSR). *Am. J. Proctol.* 28(2):37-44; 1977.

5585 IMMUNE MECHANISMS IN HUMAN COLON CANCER [Abstract]. (Eng.) Hahn, W. V.; Kagnoff, M. F.; Lewis, S.; Trefts, P. (Dept. Medicine, Univ. California, La Jolla, CA 92093). *Gastroenterology* 72(5, Part 2):1067; 1977.

5586 A MODEL OF CLINDAMYCIN ASSOCIATED COLITIS IN RABBITS [Abstract]. (Eng.) Katz, L.; LaMont, J. T.; Trier, J. S.; Sonnenblick, E.; Broitman, S. A.; Rothman, S. W. (Peter Bent Brigham Hosp., Boston, MA). *Gastroenterology* 72(5, Part 2): 1078; 1977.

5587 ISCHEMIC COLITIS. (Eng.) Cogbill, C. L.; Makkar, J.; Campana, H. A.; Park, Y. S. (Veterans Admin. Center, 4100 W. Third St., Dayton, OH 45428). *Am. Surg.* 43(3):137-143; 1977.

5588 MEDICAL MANAGEMENT OF DIVERTICULAR DISEASE: A RANDOM TRIAL [Abstract]. (Eng.) Devroede, G.; Vobecky, J. S.; Vobecky, J. M.; Beaudry, R.; Haddad, H.; Navert, B.; *et al.* (Centre Hospitalier Universitaire, Sherbrooke, Quebec, Canada). *Gastroenterology* 72(5, Part 2): 1157; 1977.

5589 THE EPIDEMIOLOGY, HISTORY AND PATHOGENESIS OF DIVERTICULOSIS COLI--BASIS FOR ITS TREATMENT WITH UNPROCESSED BRAN. (Eng.) Painter, N. S. (Manor House Hosp., London NW 11, England). *Schweiz. Med. Wochenschr.* 107(15):486-493; 1977.

5590 ELECTROMYOGRAPHY OF THE RECTUM AND COLON IN HIRSCHPRUNG'S DISEASE. (Eng.) Marin, A. M.; Rivarola, A.; Garcia, H. (Hospital de Ninos, Gallo 1330, Buenos Aires, Argentina). *J. Pediatr. Surg.* 11(4):547-552; 1976.

5591 A DOUBLE-BLIND EVALUATION OF ANTICHOLINERGIC THERAPY IN THE IRRITABLE BOWEL SYNDROME (IBS) USING COLONIC MYOELECTRICAL RECORDINGS [Abstract]. (Eng.) Sullivan, M. A.; Cohen, S.; Snape, W. J., Jr. (Hosp. Univ. Pennsylvania, Philadelphia, PA). *Gastroenterology* 72(5, Part 2): 1137; 1977.

5592 DIARRHEA IN THE IRRITABLE COLON SYNDROME. (Eng.) Diamant, N. E. (Toronto Western Hosp., 399 Bathurst St., Toronto, Ontario M5T 2S8, Canada). *Can. Med. Assoc. J.* 116(7):745-746; 1977.

5593 A DOUBLE-BLIND STUDY ON THE EFFECT OF DIETARY FIBRE ON STOOL FREQUENCY AND APPEARANCE, ABDOMINAL SYMPTOMS AND SERUM LIPID LEVELS IN PATIENTS WITH THE IRRITABLE BOWEL SYNDROME (IBS) [Abstract]. (Eng.) Watson, W. C.; Corke, M.; Pomare, E. W.; Sullivan, S. N. (Victoria Hosp., London, Ontario, Canada). *Gastroenterology* 72(5, Part 2):1146; 1977.

5594 DIETARY FIBRE IN SCANDINAVIA [Letter to Editor]. (Eng.) Heaton, K. W. (Bristol Royal Infirmary, Bristol BS2 8HW, England). *Lancet* 2(8034):407-408; 1977.

5595 COMBINED FAMILIAL ADENOMATOUS POLYPOSIS OF THE COLON (FPC) AND OF THE STOMACH (FPS)--A MORPHOLOGICAL AND CELL KINETIC STUDY [Abstract]. (Eng.) Tytgat, G. N.; Huibregtse, K.; Muller, J.; Weinstein, W. (Dept. Medicine, Univ. Amsterdam, Amsterdam, Netherlands). *Gastroenterology* 72(5, Part 2):1143; 1977.

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5597 RADIOLOGICAL DIAGNOSIS OF INTESTINAL TUBERCULOSIS [Abstract]. (Eng.) Yoshikawa, Y.; Oda, K. (Sch. Medicine, Juntendo Univ., Tokyo, Japan). *Gastroenterol. Jpn.* 12(1):95; 1977.

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5599 BILE ACIDS IN BOWEL-RELATED LIVER DISEASE [Abstract]. (Eng.) Siegel, J. H.; Barnes, S.; Morris, J. S. (Royal Free Hosp., London, England). *Gastroenterology* 72(5, Part 2):1131; 1977.

5600 THE DILEMMA OF PRESERVATION OF THE RECTUM: ILEORECTAL ANASTOMOSIS AFTER TOTAL ABDOMINAL COLECTOMY. (Eng.) Khubchandani, I. T. (Suite 111--Liberty Square Medical Center, Liberty and Seventeenth St., Allentown, PA 18104). *Dis. Colon Rectum* 20(8):649-651; 1977.

5601 TRANSSPHINTERIC APPROACH TO RECTAL LESIONS. (Eng.) Mason, A. Y. (Royal Coll. Surgeons, London, England). *Surg. Annu.* 9:171-194; 1977.

5602 APPROACH TO THE TREATMENT OF ANORECTAL DISEASE, WITH SPECIAL REFERENCE TO HEMORRHOIDS. (Eng.) Lord, P. H. (Wellington Hosp., London, England). *Surg. Annu.* 9:195-211; 1977.

5603 A NEW LOOK AT ILEOSTOMY. (Eng.) Kock, N. G. (Sahlgren's Hosp., Goteborg, Sweden). *Surg. Annu.* 8:241-256; 1976.

5604 SQUAMOUS CELL CARCINOMA OF THE ANUS. (Eng.) Wilson, S. M.; Beahrs, O. H.; Manson, R. (Mayo Graduate Sch. Medicine, Univ. Minnesota, Rochester, MN). *Surg. Annu.* 8:297-303; 1976.

5605 ACUTE SUPPURATIONS OF THE ANORECTUM. (Eng.) Abcarian, H. (Cook County Hosp., Chicago, IL). *Surg. Annu.* 8:305-333; 1976.

See also, 5295, 5317, 5323, 5324, 5338, 5356, 5358, 5359, 5360, 5361, 5421, 5507, 5526, 5529, 5531, 5538, 5552, 5614, 5617, 5622, 5697, 5776, 5780, 5786, 5792, 5793, 5795, 5798, 5799, 5807, 5817, 5818, 5825, 5826.

5606 Escherichia coli ANTIBODIES IN PATIENTS WITH INFLAMMATORY BOWEL DISEASE. (Eng.) Tabaqchali, S.; O'Donoghue, D. P.; Bettelheim, K. A. (St. Bartholomew's Hosp., London E.C.1, England). *Gut* 19(2):108-113; 1978.

To test the hypothesis that specific *Escherichia coli* serotypes are involved in the pathogenesis of inflammatory bowel disease (IBD), sera from 16 patients with Crohn's disease (CD) and 14 with ulcerative colitis (UC) were assayed for the presence of antibodies against 159 *Escherichia coli* O-antigens and compared with sera from 16 matched controls. The majority of patients with IBD had agglutinating antibodies to a higher number of *E. coli* O-antigens and in higher titers than did the controls. The number of positive agglutinins was 0-33 (mean 13.8) in CD, 0-26 (mean 7.9) in UC, and 0-7 (mean 1.5) in controls. Eight patients with IBD and arthropathy had antibodies to fewer O-antigens, 0-7 (mean 3.2). The antibodies were in the IgG and IgM, in titers corresponding to original values. No specific O-serotypes were associated with IBD. Common serotypes, R-plasmid carrying serotypes, and those associated with shigella-like adult diarrhea were detected. *E. coli* antigen 014 was detected only in five patients and 0119 in none. There was no correlation between the number of *E. coli* agglutinins and the site and severity of the disease or type of therapy. It is suggested that the presence of the high numbers of *E. coli* antibodies is secondary to the disease process and is probably not causally involved in the pathogenesis of the disease, but may play a role in the perpetuation of the disease and in the extraintestinal complications.

5607 SECRETORY IMMUNOGLOBULIN DEFICIENCY IN A FAMILY WITH INFLAMMATORY BOWEL DISEASE. (Eng.) Engstrom, J. F.; Arvanitakis, C.; Sagawa, A.; Abdou, N. I. (Kansas Univ. Medical Center, Rainbow Blvd. at 39th St., Kansas City, KS 66103). *Gastroenterology* 74(4):747-751; 1978.

A family in which 4 of 10 first-degree relatives were affected with inflammatory bowel disease (IBD) was studied to determine whether any distinct immunological abnormalities occur in the affected members, as compared with unaffected members of the family, 5 normal controls, and 8 other unrelated patients with IBD. RBC type and histocompatibility locus antigen (HL-A) phenotypes did not distinguish between healthy and affected members, although HL-A2, 32, B27, and B12 were the predominant haplotypes in members with IBD. There was no significant difference between the two groups in the lymphocyte subpopulation counts of T cells, B cells, and cells carrying crystalline fragment (Fc) or complement receptors. The *in vitro* mitogen response, however, to phytohemagglutinin and pokeweed mitogen were depressed in the affected members. Serum IgA and complement component C3 levels were significantly elevated in members with IBD compared to healthy subjects with values of 232 ± 69 versus 148 ± 29 mg/dl for IgA ($p<0.05$) and 173 ± 32 versus 115 ± 22 mg/dl for C3 ($p<0.025$), resp. Plasma and, to a lesser extent, peripheral lymphocytes from two affected members who were tested were cytotoxic to allogeneic colonic epithelial cells. Salivary IgA was normal in the affected family members and unrelated patients with IBD. However, the free secretory component of salivary IgA was absent or markedly depressed in family members, as well as in unrelated patients with ulcerative colitis. This deficiency of the secretory immune system appears to characterize more frequently ulcerative colitis than Crohn's disease and may compromise mucosal host defenses in IBD.

5608 SERUM AND FAECAL LYSOZYME IN INFLAMMATORY BOWEL DISEASE. (Eng.) Klass, H. J.; Neale, G. (Manchester Royal Infirmary, Manchester, England). *Gut* 19(3):233-239; 1978.

To assess the clinical value of measuring serum lysozyme in inflammatory bowel disease, lysozyme concentrations were measured in the serum and stools of 61 patients with inflammatory bowel disease and compared with those in 29 normal controls, 20 patients with noninflammatory gastrointestinal disease, and 20 patients without gastrointestinal disease. By the turbidometric method, lysozyme values were considerably greater in the serum of patients with active Crohn's disease (9.2 ± 2.7 µg/ml) than in the serum of healthy controls (4.4 ± 2.0 µg/ml). They did not, however, distinguish individual patients with Crohn's disease from those with ulcerative colitis or from those with a variety of other gastrointestinal conditions. The lysoplate method gave much higher values for serum lysozyme than did the turbidometric method, but there was a considerable overlap between the results for patients with Crohn's disease (60.1 ± 30.7 µg/ml) and normal controls (27.4 ± 17.5 µg/ml). There was only a moderate correlation between the results given by the two methods ($r=0.56$), and it is suggested that factors other than enzyme activity and methodological variation are responsible for the observed differences. This idea is supported by the finding that with Crohn's disease in remission serum lysozyme values (lysoplate) returned to normal values; however, with the turbidometric method, they remained raised. Mean fecal lysozyme levels, expressed either as a concentration or as total daily excretion, in patients with inflammatory bowel disease were significantly greater than values in healthy controls ($p<0.05$) and in diseased subjects without diarrhea ($p<0.05$) but were not significantly different from those subjects with other causes of diarrhea. The present evidence suggests that the role of lysozyme in inflammatory bowel disease is of epiphenomenonal rather than pathogenetic significance. The present results suggest that it is unlikely to come into routine use as a diagnostic marker or as an index of activity in inflammatory bowel disease.

5609 HYPOSPLENISM IN INFLAMMATORY BOWEL DISEASE. (Eng.) Ryan, F. P.; Smart, R. C.; Holdsworth, C. D.; Preston, F. E. (Royal Infirmary, Sheffield, England). *Gut* 19(1):50-55; 1978.

Since hyposplenism has been reported in patients with ulcerative colitis, splenic function was assessed in 35 patients with ulcerative colitis and 20 patients with Crohn's disease. Hyposplenism was diagnosed if there were Howell-Jolly bodies in the peripheral blood film or if there was prolongation of clearance from the peripheral blood of injected ^{51}Cr-labeled heat-damaged RBC. Thirteen patients with ulcerative colitis had hyposplensim as compared with only one patient with Crohn's disease. Conversely, heat-damaged RBC clearance values faster than the normal range were found in 6 of the 20 patients with Crohn's disease. Four patients with hyposplenism and ulcerative colitis developed life-threatening septicemia in the early postcolectomy period, two of these being further complicated by disseminated intravascular coagulation. These studies indicate that hyposplenism is a common complication of ulcerative colitis, occurring only in those patients with extensive colonic involvement and having either a severe relapse or a persistently active course.

5610 SERIAL CARCINOEMBRYONIC ANTIGEN (CEA) BLOOD LEVELS IN PATIENTS WITH ULCERATIVE COLITIS. (Eng.) Gardner, R. C.; Feinerman, A. E.; Kantrowitz, P. A.; Gootblatt, S.; Loewenstein, M. S.; Zamcheck, N. (Mount Auburn Hosp., 330 Mount Auburn St., Cambridge, MA 02138). *Am. J. Dig. Dis.* 23(2):129-133; 1978.

Fifty-seven patients with ulcerative colitis were followed 1-49 months (mean, 18 months) with serial carcinoembryonic antigen (CEA) determinations during periods of remission, mild relapses, and severe relapses, to assess the clinical usefulness of CEA titers in ulcerative colitis. Elevated CEA titers correlated with activity (i.e., severity, $p<0.005$) and possibly extent of disease ($p<0.1$): 12% of patients with proctitis, 47% of patients with left-sided colitis, and 60% of patients with transverse or universal colitis had elevated CEA titers during a flare. Moreover, 24% of patients with mild flares and 86% of patients with severe flares had elevated CEA titers. Ninety-two percent of patients with extensive disease and severe flares had elevated CEA titers. Elevated CEA titers were correlated with histologic findings in three patients. Mucosal inflammation was demonstrated by colonoscopy and confirmed by biopsy in one patient with persistently elevated CEA titers during clinical remission. In two other patients with active disease whose CEA titers fell prior to colectomy, marked denudation of colonic mucosa was noted. In this study, a transiently elevated CEA titer indicated either clinically active ulcerative colitis or active inflammation of colonic mucosa.

5611 CIRCULATING IMMUNE COMPLEXES IN ULCERATIVE COLITIS. I. CORRELATION TO DISEASE ACTIVITY. (Eng.) Nielsen, H.; Binder, V.; Daugharty, H.; Svehag, S. E. (Inst. Medical Microbiology, Odense Univ., DK-5000 Odense, Denmark). *Clin. Exp. Immunol.* 31(1):72-80; 1978.

Twenty-two patients with ulcerative colitis (UC) were studied to determine whether the presence of circulating immune complexes (IC) correlates with disease duration or activity and to determine the effect of medical treatment on circulating IC levels. The occurrence of IC was analyzed by three independent methods; a complement consumption assay, a Clq-binding assay, and a rheumatoid (RF)-binding assay. Antinuclear factor (ANF) and RF determinations were also performed to evaluate the possible contribution of these antibody activities to the IC demonstrated. All patients had UC in an active stage when the study was initiated. Positiveness in two or more test systems was considered to indicate the presence of IC in the serum sample examined. By this criterion, circulating complement-fixing IC were detected in 8 of the 22 patients (95% confidence limits: 17-60%). IC were detected most frequently in patients with long-standing disease. A correlation ($p<0.01$) between the occurrence of circulating IC and disease activity, in terms of visible blood in feces and number of bowel movements per day, was demonstrated. Cytological examination of the rectal mucus indicated moderate to severe inflammation in all IC-positive patients. Six of the eight IC-positive patients were subjected to short-term glucocorticosteroid treatment. Only one of these patients exhibited circulating IC and high disease activity after treatment; this patient was colectomized. Salazosulphapyridine treatment showed no relation to IC occurrence. None of the 22 sera were RF-positive. Four of the 22 patients (95% confidence limits 5-40%) were positive for organ nonspecific ANF, but the presence of ANF did not correlate with circulating IC. There was no significant correlation between antibody titers to *Escherichia coli* 0119:B14 antigen and IC occurrence. These studies indicate that there is a correlation between IC and disease activity and duration.

5612 CIRCULATING IMMUNE COMPLEXES IN ULCERATIVE COLITIS. II. CORRELATION WITH SERUM PROTEIN CONCENTRATIONS AND COMPLEMENT CONVERSION PRODUCTS. (Eng.) Nielsen, H.; Petersen, P. H.; Svehag, S. E. (Inst. Medical Microbiology, Odense Univ., DK-5000 Odense, Denmark). *Clin. Exp. Immunol.* 31(1):81-91; 1978.

To determine whether there is a correlation between the occurrence of circulating immune complexes (IC) and the serum concentration of native and/or activated complement factors in ulcerative colitis, several serum proteins were quantified in 22 patients with active disease, and the findings were related to disease activity and occurrence of IC. Conversion of complement component C3 was significantly more frequent in the IC-positive group (8 patients) as compared to the IC-negative group (14 patients). Factor $\bar{B}$ was demonstrable in 15 of the 22 patients, and 7 of the 8 IC-positive patients had detectable levels of factor $\bar{B}$. There was no difference between the IC-positive and the IC-negative group as regards serum concentrations of the complement

factors C3, C4, and factor B, or serum orosomucoid, albumin, IgM, and IgG. In contrast, the serum IgA levels were reduced in the IC-positive group, in comparison with the IC-negative group ($p<0.05$). C3 and factor B were significantly elevated in four patients with severe disease activity, compared with the reference group ($p<0.01$). C3, factor B, and C4 concentrations showed a positive correlation to the serum orosomucoid levels, factor B having the best correlation ($r=0.88$, $2\alpha<0.001$). The serum concentrations of orosomucoid and albumin were inversely correlated to each other. The deposition of IC in the intestinal mucosa, resulting in complement activation and possibly also local IC-dependent lymphocytotoxicity, are likely to represent contributing pathogenic mechanisms in the tissue destruction observed in the colonic mucosa of ulcerative colitis patients.

5613 SENSIBILITY OF THE RECTUM TO DISTENSION AND THE ANORECTAL DISTENSION REFLEX IN ULCERATIVE COLITIS. (Eng.) Farthing, M. J. G.; Lennard-Jones, J. E. (St. Bartholomew's Hosp., London, England). *Gut* 19(1):64-69; 1978.

The anorectal distention reflex and rectal sensation were studied in 34 patients with colitis and in 15 controls. The maximum volume of air tolerated within a rectal balloon was less in the colitis patients than in normal subjects ($p<0.001$). Smaller volumes were tolerated by patients with a spontaneously bleeding mucosa than by those with less severe inflammation ($p<0.001$). Severe urgency of defecation with incontinence was experienced by about half those with spontaneous mucosal hemorrhage but was infrequent among other colitics. Those patients with inactive colitis and a reduced maximum tolerable volume tended to have a smaller rectal size than those who could tolerate a normal volume within the rectum. Reflex relaxation of the internal anal sphincter on distention of the rectum appeared normal in patients with colitis. The results show that mucosal inflammation affects the sensory response of the rectum to distention, which may be a factor involved in the urgency and incontinence of colitis.

5614 MALAKOPLAKIA IN ULCERATIVE COLITIS. (Eng.) MacKay, E. H. (Leicester Royal Infirmary, Leicestershire, England). *Arch. Pathol. Lab. Med.* 102(3):140-145; 1978.

The case of a 59-yr-old woman with a 30-yr history of proven ulcerative colitis in whom classic malakoplakia was found in the colon is presented. She had undergone total proctocolectomy after failure of medical treatment to control her illness. Immunoperoxidase studies showed immunoglobulins and muramidase within the malakoplakic histiocytes, and electron microscopy showed bacteria resembling *Escherichia coli* in the same cells. Immunologic studies showed an unusually high *E. coli* antibody titer (1:512) in her serum and reduced numbers of circulating T-lymphocytes with reduced cytotoxic activity. This case shows the paradoxical rarity of malakoplakia in ulcerative colitis and reaffirms the presence of an immunologic defect that may be pathogenetically significant.

5615 THROMBOPHLEBITIS MIGRANS IN ULCERATIVE COLITIS. (Eng.) Camilleri, M.; Fenech, F. F. (St. Luke Hosp., Guardamangia, Malta). *Postgrad. Med. J.* 53(626):762-763; 1977.

The case of a 48-yr-old woman suffering from ulcerative colitis and thrombophlebitis migrans is presented. The woman suffered a relapse of the ulcerative colitis, which she had had for 13 yr. She was not clinically anemic or jaundiced. On hospital admission, there was a warm, tender swelling on the medial aspect of the left arm. Sigmoidoscopy was consistent with a diagnosis of active ulcerative colitis. Three days after admission, she developed thrombophlebitis of the left forearm, while the swelling in the upper arm began to subside. This pattern of localized thrombophlebitis continued and involved both legs and both thighs. At each site, it lasted 3-4 days. A panproctocolectomy and ileostomy were performed. Macroscopic examination of the colon revealed total involvement by ulcerative colitis. A thorough histological examination failed to reveal any malignant areas. This is the first reported case of thrombophlebitis migrans in ulcerative colitis. The authors believe that the occurrence of thrombophlebitis migrans in ulcerative colitis warrants a thorough investigation of carcinoma.

5616 INFLAMMATORY BOWEL DISEASE OF THE AGED: A PATHOLOGIC AND DIAGNOSTIC DILEMMA [Abstract]. (Eng.) Lorber, S. H.; Ming, S.; Ritchie, W. G.; Tolin, R.; Mayer, E. (Temple Univ. Health Sciences Center, Philadelphia, PA). *Gastroenterology* 72(5, Part 2):1090; 1977.

5617 GENETIC AND POST-OPERATIVE STUDIES OF ANERGY TO DINITROCHLOROBENZENE (DNCB) IN INFLAMMATORY BOWEL DISEASE (IBD) [Abstract]. (Eng.) Meyers, S.; Sachar, D. B.; Taub, R. N.; Janowitz, H. D. (Mount Sinai Sch. Medicine, City Univ. New York, New York, NY 10029). *Gastroenterology* 72(5, Part 2):1101; 1977.

5618 A MODEL OF ULCERATIVE COLITIS PRODUCED IN THE RABBIT WITH DINITROCHLOROBENZENE (DNCB) [Abstract]. (Eng.) Rabin, B. S.; Rogers, S. J. (Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA 15261). *Gastroenterology* 72(5, Part 2):1114; 1977.

5619 MORPHOLOGICAL CHANGES IN THE RECTAL MUCOSA IN PATIENTS WITH ULCERATIVE COLITIS TREATED WITH DISODIUM CROMOGLYCATE [Abstract]. (Eng.) Mani, V.; Lloyd, G.; Green, F. H. Y.; Fox, H.; Turnberg, L. A. (Hope Hosp., Salford M6 8HD, England). *Gastroenterology* 72(5, Part 2):1093; 1977.

5620 LONG TERM OBSERVATIONS OF CHILDREN WITH ULCERATIVE COLITIS TREATED WITH AN IMMUNOSUPPRESSIVE (6 MERCAPTOPURINE) [Abstract]. (Eng.) Korelitz, B. I.; Glass, J. L.; Wisch, N. (Lenox Hill Hosp., New York, NY). *Gastroenterology* 72(5, Part 2):1083; 1977.

5621 OPTIMAL DOSE OF SULPHASALAZINE FOR THE MAINTENANCE TREATMENT OF ULCERATIVE COLITIS: INTERIM RESULTS OF A CONTROLLED THERAPEUTIC TRIAL [Abstract]. (Eng.) Khan, A. K. A.; Howes, D. T.; Piris, J.; Truelove, S. C. (Radcliffe Infirmary, Oxford, England). *Gut* 18(5):A421-A422; 1977.

5622 ENTERITIS AND THE CONTINENT ILEOSTOMY. (Eng.) King, S. A. (Stamford Hosp., Stamford, CT). *Conn. Med.* 41(8):477-479; 1977.

See also, 5127, 5302, 5550, 5582, 5597, 5837, 5838.

PANCREAS

5623 HUMAN ISLET CELL TUMOR STORING PANCREATIC POLYPEPTIDE: A LIGHT AND ELECTRON MICROSCOPIC STUDY. (Eng.) Bordi, C.; Togni, R.; Baetens, D.; Ravazzola, M.; Malaisse-Lagae, F.; Orci, L. (Institut d'Histologie et d'Embryologie, Ecole de Medecine, 1211 Geneve 4, Switzerland). *J. Clin. Endocrinol. Metab.* 46(2):215-219; 1978.

Pancreatic polypeptide (PP) isolated from a 45-yr-old man with an islet cell tumor storing PP was studied ultrastructurally. During surgery for long-standing peptic ulcer disease, the pancreas was investigated for suspected Zollinger-Ellison syndrome, and tumor nodules were found. The tumor tissue was examined by immunofluorescence and showed specific staining only after incubation with anti-pancreatic polypeptide. Negative results were obtained with antisera directed against insulin, pancreatic glucagon, somatostatin, insulin, vasoactive intestinal peptide, secretin, and gastrin. Electron microscopy revealed a homogeneous population of small granule-containing cells. This case illustrates a tumor composed of a single hormone-producing cell type and allows definition of the ultrastructural features of human pancreatic polypeptide-containing cells.

5624 PANCREATIC PSEUDOCYST: MANAGEMENT IN FIFTY-FOUR PATIENTS. (Eng.) Pollak, E. W.; Michas, C. A.; Wolfman, E. F., Jr. (8940 Nall Ave., Overland Park, KS 66207). *Am. J. Surg.* 135 (2):199-201; 1978.

The management of pancreatic pseudocyst was reassessed in 54 patients followed for 3 months to 9 yr after diagnosis. All patients were initially managed nonoperatively. Only 16 regressed with nonoperative management; 6 died of septic complications, and 32 eventually required operation. Most pseudocysts did not regress with nonoperative therapy, emphasizing the need of serial clinical and ultrasonic examination at frequent intervals to detect nonresolution or complications requiring earlier operation than previously advocated.

5625 ISOLATION AND CHARACTERIZATION OF THE GLYCOPEPTIDE FROM A PANCREATIC CYST. (Eng.) Masuda, H.; Schichijo, S.; Takeuchi, M. (Kurume Univ., Sch. Medicine, Kurume, Fukuoka 830, Japan). *Int. J. Biochem.* 8(9):627-631; 1977.

5626 RADIONUCLIDE PANCREATIC SCANNING: A RETROSPECTIVE ANALYSIS. (Eng.) Kitchen, P. R. B.; Wettenhall, J. M.; Andrews, J. T. (Royal Melbourne Hosp., Victoria 3050, Australia). *Aust. N.Z. J. Surg.* 47(4):501-505; 1977.

5627 MULTINUCLEATED GIANT CELL NEOPLASM OF PANCREAS: LIGHT AND ELECTRON MICROSCOPY FEATURES. (Eng.) Robinson, L.; Damjenov, I.; Brezina, P. (Univ. Alabama Medical Center, Birmingham, AL 35294). *Arch. Pathol. Lab. Med.* 101(11): 590-593; 1977.

5628 ULTRASONOGRAPHY OF A MEDIASTINAL PSEUDOCYST. (Eng.) Asokan, S.; Alagratnam, D.; Eftaha, M.; Radhakrishnan, J.; Lim, L. T.; Teresi, M. (Cook County Hosp., 1825 West Harrison St., Chicago, IL 60612). *Am. J. Roentgenol.* 129 (5):923-924; 1977.

5629 SEROTYPING OF Pseudomonas aeruginosa FROM PATIENTS WITH CYSTIC FIBROSIS OF THE PANCREAS. (Eng.) Hirao, Y.; Homma, J. Y.; Zierdt, C. H. (Inst. Medical Science, Univ. Tokyo, Shirokanedai, Mimato-ku, Tokyo 108, Japan). *Jpn. J. Exp. Med.* 47(4):249-254; 1977.

5630 PAPILLARY CYSTADENOCARCINOMA OF THE PANCREAS. (Eng.) Golematis, B.; Georga-

kakis, A.; Bastounis, E.; Bramis, J.; Dreiling, D. A. (Medical Sch., Univ. Athens, Athens, Greece). *Am. J. Gastroenterol.* 67(6):600-603; 1977.

5631 FOLLOW-UP STUDIES OF RADICAL RESECTION FOR PANCREATICODUODENAL CANCER. (Eng.) Sato, T.; Saitoh, Y.; Noto, N.; Matsuno, S. (Tohoku Univ. Sch. Medicine, Sendai 980, Japan). *Ann. Surg.* 186(5):581-588; 1977.

See also, 5290, 5330, 5331, 5332, 5346, 5351, 5352, 5364, 5366, 5367, 5486, 5550, 5632, 5634, 5661, 5776, 5790.

PANCREAS

Pancreatitis

5632 GLUCAGON INHIBITION OF SECRETIN AND COMBINED SECRETIN AND CHOLECYSTOKININ STIMULATED PANCREATIC EXOCRINE SECRETION IN HEALTH AND DISEASE. (Eng.) Clain, J. E.; Barbezat, G. O.; Waterworth, M. M.; Bank, S. (Groote Schuur Hosp., Observatory, 7925, Cape Town, South Africa). *Digestion* 17(1):11-17; 1978.

To investigate the potential therapeutic value of glucagon in acute pancreatitis, the effect of glucagon infusion on secretin- and on secretin plus cholecystokinin (CCK)-stimulated exocrine pancreatic secretion was studied in 12 normal subjects, 11 patients at least 6 weeks post acute pancreatitis (PAP), and in 10 patients with chronic calcifying pancreatitis (CCP). Secretin (1 µg/kg/hr) or secretin plus CCK (1 µg/kg/hr) were infused for the entire 200-min test period; 60 min after the start of infusion, glucagon was also infused (7.5 µg/kg/hr for 40 min, then 15 µg/kg/hr for 40 min). Duodenal samples were collected at 10-min intervals. In the secretin-stimulated trials, glucagon had no effect on secretin volume in controls or in the CCP group, but significantly increased the volume in the PAP group ($p<0.025$). Bicarbonate concentration was unaffected, its output following the volume changes. Protein concentration before glucagon was significantly higher in the PAP ($p<0.005$) and CCP ($p<0.05$) groups than in the controls. Glucagon significantly decreased pancreatic protein secretion in all three groups ($p<0.05$ for controls and PAP, $p<0.02$ for CCP). Bile pigment production was higher in PAP and CCP groups than in controls before glucagon infusion, rose in all groups during infusion, and returned to initial values in the PAP and CCP groups while increasing ninefold ($p<0.01$) in the controls after infusion. In the secretin plus CCK trials, the only significant changes in volume or bicarbonate output occurred in the controls ($p<0.05$). Protein concentration decreased significantly in the controls and PAP group ($p<0.02$), and protein output decreased significantly in all groups ($p<0.025$) due to glucagon infusion. Bile pigment production decreased significantly in the controls ($p<0.05$) and PAP group ($p<0.02$), returning to normal upon glucagon withdrawal. In all individuals in all trials there was a rise in blood glucose during glucagon infusion; after the infusion, the controls became hypoglycemic, but the response of the patients was variable due to diabetes in five of them. These results indicate that glucagon given by constant infusion produces inhibition of pancreatic enzyme secretion in healthy volunteers and in patients with pancreatic disease and that further trials of glucagon in the therapy of acute pancreatitis are warranted.

5633 FAILURE OF GLUCAGON IN THE TREATMENT OF ALCOHOLIC PANCREATITIS. (Eng.) Olazabal, A.; Fuller, R. (Cleveland Veterans Admin. Hosp., 10701 E. Blvd., Cleveland, OH 44106). *Gastroenterology* 74(3):489-491; 1978.

To evaluate the efficacy of glucagon for alcohol-related pancreatitis, a controlled, randomized, double-blind study was carried out in 26 patients with pancreatitis associated with alcohol ingestion. These patients received either glucagon or placebo in addition to i.v. fluids, nasogastric suction, and meperidine as needed. There were no statistically significant differences between the group that received glucagon and the group that did not in any of 12 parameters, which included symptoms, signs, laboratory tests, and requests for analgesia. It is concluded that glucagon in addition to conventional therapy is no better for the treatment of alcoholic pancreatitis than conventional therapy alone.

5634 ENDOSCOPIC RETROGRADE PANCREATOGRAPHY: ANALYSIS OF THE NORMAL PANCREATOGRAM, AND CHANGES WHICH ARE ASSOCIATED WITH CHRONIC PANCREATITIS AND PANCREATIC CANCER. (Eng.) Roberts-Thomson, T. C. (Royal Melbourne Hosp., Victoria 3050, Australia). *Med. J. Aust.* 2(24):793-796; 1977.

Studies were carried out to define the normal pancreatogram, to categorize changes in the main pancreatic duct, and to determine the relative frequency of these changes in patients with chronic pancreatitis and pancreatic cancer. The dimensions

of the normal pancreatogram were determined by studies in 30 adults without demonstrable pancreatic disease. The main pancreatic duct had a mean maximum diameter of 3.1 mm, 2.3 mm, and 1.4 mm in the head, body, and tail of the pancreas, resp.; diameters at the upper limit of normal were 4 mm, 3 mm, and 2 mm in these three regions. The relative frequency of changes in the main pancreatic duct was determined in 45 patients with chronic pancreatitis and 14 patients with pancreatic cancer. Obstruction of the main duct was usually associated with cancer, whereas dilatation throughout the duct was only observed in chronic pancreatitis. Segmental stricture was common in both diseases, but analysis of the corresponding cholangiogram permitted differentiation in some patients. Gross distortion of the duct system occurred only in chronic pancreatitis, and was frequently associated with calcification, which was seen on plain abdominal x-ray film. The main pancreatic duct showed no abnormalities in 5/45 patients with chronic pancreatitis and 1/14 patients with cancer. The analysis of changes in the main pancreatic duct usually permitted differentiation of chronic pancreatitis from pancreatic cancer. This study corroborates previous reports of the value of pancreatography in the diagnosis of chronic pancreatitis and pancreatic cancer.

5635 PARENTERAL FEEDING IN POSTOPERATIVE PANCREATITIS. (Ger.) Hartig, W.; Albert, H.; Czarnetzki, H. D. (I. Chirurgischen Klinik des Bezirkskrankenhauses St. Georg., Strasse der DSF 141, DDR-7021 Leipzig, E. Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 37(1):7-16; 1977.

5636 CLINICAL ASPECTS OF CHRONIC PANCREATITIS IN ADULTS. (Ita.) Dobrilla, G. (Ospedale Generale Regionale di Bolzano, Bolzano, Italy). *Minerva Med.* 68(30):2087-2092; 1977.

5637 CURRENT PATHOLOGICAL PROBLEMS OF CHRONIC PANCREATITIS. (Ita.) Giarelli, L.; Stanta, G.; Di Bonito, L.; Brollo, A. (Istituto di Anatomia e Istologia Patologica, Universita degli Studi di Trieste, Trieste, Italy). *Minerva Med.* 68(30):2063-2076; 1977.

5638 PATHOGENETIC ASPECTS OF CHRONIC PANCREATITIS. (Ita.) Gullo, L.; Fontana, G.; Costa, P. L.; Bolondi, L.; Ventrucci, M.; Caletti, G. C.; *et al.* (Istituto di Clinica Medica I, Universita degli Studi di Bologna, Bologna, Italy). *Minerva Med.* 68(30):2057-2061; 1977.

5639 FAMILIAL CHRONIC PANCREATITIS. (Fre.) Selman, M. (Universite Claude Bernard, Lyon, France). *Rev. Fr. Gastroenterol.* (129):59-65; 1977.

5640 CLINICO-MORPHOLOGICAL COMPARISONS OF PANCREATIC CHANGES. (Rus.) Matveeva, I. I.; Yakubovich, A. A. (Propedeutic Dept. Internal Medicine, Leningrad Inst. Hygiene and Medicine, Leningrad, USSR). *Klin. Med. (Mosk.)* 55(2):48-50; 1977.

5641 AN INFILTRATIVE FORM OF ACUTE PANCREATITIS AND ITS EVOLUTION. (Rus.) Filin, V. I.; Krokhin, Ju. Ya.; Mukhina, T. V.; Sukharev, V. F. (I. I. Dzhanelidze Leningrad Scientific Res. Inst. First Aid, Leningrad, USSR). *Vestn. Khir.* 118(2): 8-12; 1977.

5642 PATHOGENESIS OF ACUTE PANCREATITIS. (Rus.) Ivashkevich, G. A. (Dept. Hosp. Surgery, Lvov Medical Inst., Lvov, USSR). *Klin. Khir.* (4): 7-13; 1977.

5643 CHANGES IN PROTEIN METABOLISM IN PATIENTS WITH ACUTE PANCREATITIS. (Rus.) Graudinsh, J. J.; Chernyakova, D. E.; Slyshane, S. J. (Surgical Clinic, Riga Medical Inst., Riga, USSR). *Khirurgiia (Mosk.)* (3):79-83; 1977.

5644 SIGNIFICANCE OF IMMUNOLOGICAL INVESTIGATIONS IN PANCREATITIS. (Rus.) Vel'bri, S. K. (Central Medical Scientific Res. Lab., Tartu Univ., Tartu, USSR). *Ter. Arkh.* 49(2):142-147; 1977.

See also, 5330, 5331, 5352, 5367, 5481, 5550, 5624, 5626.

LIVER AND BILIARY TRACT

5645 SEVERE CHRONIC ACTIVE LIVER DISEASE: PROGNOSTIC SIGNIFICANCE OF INITIAL MORPHOLOGIC PATTERNS. (Eng.) Schalm, S. W.; Korman, M. G.; Summerskill, W. H. J.; Czaja, A. J.; Baggenstoss, A. H. (Mayo Clinic, Rochester, MN 55901). *Am. J. Dig. Dis.* 22(11):973-980; 1977.

To determine the usefulness of recognizing different morphologic patterns of chronic active liver disease (CALD), clinical and biochemical features were compared with response to treatment in 32 patients with chronic active hepatitis (CAH), 36 with subacute hepatitis and bridging necrosis (SHB), 30

with subacute hepatitis and multilobular necrosis (SHMN), and 30 with cirrhosis and active hepatitis (Cirrh). Of the 128 patients, 99 were treated with prednisone (20 mg daily or 10-50 mg every other day) or prednisone (10 mg daily) plus azathioprine (50 mg daily). The type of morphological lesion did not correlate with clinical or etiologic features. Patients with CAH had less severe biochemical abnormalities, entered remission more often (77% versus 57% for SHB, 60% for SHMN, or 56% for Cirrh), and failed to respond to treatment less frequently (4% versus 20% for SHB, 24% for SHMN or 33% for Cirrh) than those with SHMN or Cirrh. SHB and SHMN tended to be more frequently associated with a short duration of symptoms, whereas ascites and varices were more frequent in Cirrh. CAH differed from Cirrh and SHMN by the lower incidence of spider nevi ($p<0.05$). Abnormalities in SGOT, bilirubin, albumin, gamma globulin, and prothrombin time were usually more severe in SHB, SHMN, and Cirrh than in CAH. Stepwise discriminant analysis showed that the presence of vascular spiders and the degrees of SGOT elevation and hypoalbuminemia were each significantly less frequent ($p<0.05$) in CAH than in Cirrh. Vascular spiders and the degree of elevation of SGOT in SHMN and the incidence of viral features in SHB distinguished these lesions from CAH. There were significantly lower ($p<0.05$) serum albumin concentrations in Cirrh than in SHMN. Serial liver biopsies disclosed all possible transitions between the various lesions in individual patients. Patients receiving prednisone usually improved from SHB or SHMN through CAH to chronic persistent hepatitis. CAH, SHB, SHMN, and Cirrh, therefore, reflect the degree and extent of disease activity at any given time in CALD, rather than representing different conditions.

5646 SERUM GLYCOPROTEIN TESTS IN LIVER DISEASES. (Hun.) Feher, J.; Jakab, L.; Lengyel, G.; Romics, L. (III. Belgyogyaszati Klinika, Semmelweis Orvostudomanyi Egyetem, Budapest, Hungary). *Orv. Hetil.* 118(43):2579-2581; 1977.

The serum haptoglobin, hemopexin, alpha-1-antitrypsin, and orosomucoid levels were studied in 123 patients with chronic hepatopathies and 18 healthy controls to assess the diagnostic value of these glycoproteins. Chronic persistent hepatitis was diagnosed in 9 patients, chronic aggressive hepatitis in 27, postnecrotic cirrhosis in 26, hyperlipoproteinemia without hepatic changes in 10, hyperlipoproteinemia with histologically manifest hepatic steatosis in 19, alcoholic liver cirrhosis in 17, and chronic cholangiohepatitis in 15. Compared to controls, the serum glycoprotein concentrations showed no changes in patients with chronic persistent hepatitis, while the haptoglobin level decreased in patients with chronic aggressive hepatitis and postnecrotic liver cirrhosis but increased in those with liver steatosis, alcoholic liver cirrhosis, and cholangiohepatitis. The hemopexin concentration was reduced in patients with liver cirrhosis and increased in those with hyperlipoproteinemia with or without steatosis or chronic cholangiohepatitis. The alpha-1-antitrypsin concentration was increased in patients with alcoholic liver cirrhosis. The orosomucoid level decreased in patients with postnecrotic cirrhosis. The findings indicate the potential diagnostic value of serum glycoprotein tests in various hepatopathies.

5647 ELECTROLYTES AND MICROELEMENTS OF THE BLOOD AND BILE IN PATIENTS WITH CHRONIC DISEASES OF THE LIVER AND BILE DUCTS. (Rus.) Revutskii, B. I. (Medical Inst., Donetsk, USSR). *Vrach. Delo* (9):81-86; 1977.

The electrolyte and trace element composition of the blood and bile was studied in a group of 215 patients with chronic lesions of the liver and biliary ducts. The group included 125 patients with chronic cholangiohepatitis, 59 with chronic hepatitis, and 31 with cirrhosis. A positive correlation between the potassium content and total protein in the vesical fraction of the bile was observed in the patients with chronic cholangiohepatitis, while the patients with chronic hepatitis and cirrhosis showed positive correlation between the potassium level and residual nitrogen level in the liver fraction of the bile.

5648 LIPID SUBSTRATES FOR LCAT ACTIVITY IN LIVER DISEASE. (Eng.) Salvioli, G.; Lugli, R.; Salati, R. (Dept. Clinical Medicine, Univ. Modena, Modena, Italy). *Scand. J. Gastroenterol.* 12(7):841-847; 1977.

To investigate the possibility that the low content of unsaturated fatty acids in the phosphatidylcholine (PC) of high density lipoproteins (HDL) could reduce the rate of cholesterol esters (CE) in the plasma, the activity of the plasma lecithin: cholesterol acyltransferase (LCAT) was studied in eight healthy controls, six patients with obstructive jaundice, and eight patients with advanced liver cirrhosis. Polyunsaturated PC (PU-PC, 3 g, i.v.), as a special substrate, was administered to all subjects. Before and after the infusion, the transesterification rate was assayed by three different methods: (1) assay using plasma against a standard substrate, (2) assay of pooled plasma of normal subjects against substrate prepared from the plasma of the patients, and (3) assay in which free cholesterol was labeled in autologous plasma serving as both enzyme and substrate source. In normal subjects, no statistically significant differences of the enzyme activity levels were observed before PU-PC infusion. There was a tendency to lower LCAT activity in patients with liver disease compared with normal subjects before PU-PC infusion. After PU-PC infusion, a significant increase of LCAT activity was observed with methods 2 and 3 in patients with cholestasis (32.8/47.2 and 30.4/51.1 μM/l/hr, resp.) and with method 3 in patients with cirrhosis (20.3/34.6 μM/l/hr). Gas chromatography of HDL-PC and HDL-cholesterol revealed a low content of polyunsaturated fatty acids in patients with liver disease as compared to normals. PU-PC infusion yielded an increased content particularly of linoleic acid in these HDL lipids. Since the LCAT-mediated reaction takes place on or within

HDL and since the activation of LCAT was most effective with PU-PC, the transesterification of cholesterol appears to depend on HDL enriched in PU-PC as the preferred substrate for LCAT.

5649 LAPAROSCOPY IN THE DIAGNOSIS OF PRIMARY CANCER OF THE LIVER. (Rus.) Chernekhovskaia, N. E.; Anchukova, E. L.; Chechulina, A. P. (Dept. Endoscopy, S. P. Botkin Clinical Hosp., Moscow, USSR). *Khirurgiia (Mosk.)* (1):47-49; 1978.

To improve the differential diagnosis of primary and metastatic liver carcinoma, the results of laparoscopy performed in 24 patients with primary liver carcinoma are reviewed. The patients were seen with asthenia (12), pain in the right hypochondrium (17), weight loss (9), loss of appetite (6), and fever (6). All patients had liver enlargement, and 12 patients had yellowness of the skin and sclera. Only four patients had an initial clinical diagnosis of primary carcinoma, while the rest of the patients underwent laparoscopy with an initial diagnosis of cirrhosis, tumor of the abdominal cavity, cholecystitis, cancer of the pancreas head, obstructive jaundice, acute pancreatitis, and gallbladder or right colon cancer. At laparoscopy, 8 patients were found to have the nodular variant of primary liver carcinoma, 6 were found to have the massive variant (large tumor up to 8-10 cm in diameter in the right lobe and multiple small metastatic nodes in the right and left lobes), and 10 patients were found to have the diffuse variant. Cytologic confirmation of the diagnosis was obtained in 11/13 patients subjected to spot biopsy.

5650 SPONTANEOUS RUPTURE OF LIVER TUMORS WITH INTRA-ABDOMINAL HEMORRHAGE AND HEMATOBILIA. (Rus.) Shapkin, V.; Grinenko, A.; Manikhas, G. (Vladivostok Medical Inst., Vladivostok, USSR). *Klin. Med. (Mosk.)* 55(11):89-93; 1977.

Of 98 patients with primary liver carcinoma, 5 developed spontaneous tumor rupture complicated by intra-abdominal hemorrhage. Correct preoperative diagnosis of intra-abdominal hemorrhage was made in only one patient, while in four patients the disease was misdiagnosed as perforating ulcer or destructive cholecystitis. One patient underwent liver resection and four underwent palliative surgery. Of 36 patients with benign liver tumors, 1 had spontaneous rupture with intra-abdominal hemorrhage and 1 had hematobilia (both patients had hemangiomas).

5651 CLINICAL COURSE AND PROGNOSIS OF ONE HUNDRED AND TWO PATIENTS WITH HEPATIC COMA 1958 THROUGH 1975. (Eng.) Ukida, M.; Shimada, Y. (Iwakuni Natl. Hosp., 2-5-1 Kuroiso-cho, Iwakuni City, 740 Japan). *Gastroenterol. Jpn.* 12(5):368-379; 1977.

The clinical course and prognosis of hepatic coma were examined in 102 patients treated between 1958 and 1975. The diagnoses included fulminant hepatitis (9), subacute hepatitis (7), liver cirrhosis without liver carcinoma (53), and liver cirrhosis with primary liver carcinoma (33). Four of nine patients with fulminant hepatitis regained consciousness within 1 week and recovered completely. Seven patients with subacute hepatitis died within 2 weeks after the onset of hepatic coma. In the period from 1958 to 1969, 20% of patients with liver cirrhosis with the acute type of liver failure recovered from the coma, and in the period from 1970 to 1975, 45% of patients recovered. Seven of 10 patients with the chronic type of hepatic failure died between 4 months and 9 yr after the onset of coma. Three other patients are still alive. The median survival time was 2.5 yr. Nine patients with primary liver carcinoma and liver coma were hospitalized from 1958 to 1969 and 24 from 1970 to 1975. The hepatorenal syndrome was present in 31 of 71 examined patients. Twenty-three patients with the hepatorenal syndrome were hospitalized in the period from 1970 to 1975. These results suggest that the complication rate in primary liver carcinoma and the frequency of the hepatorenal syndrome in patients with liver coma have increased during the last few years.

5652 CHARACTERISTICS OF HEPATIC COMA IN CHRONIC LIVER DAMAGE IN THE ELDERLY. (Rus.) Postovit, V. A.; Osipov, L. N.; Zhurkin, A. T. (Leningrad Inst. Pediatrics, Leningrad, USSR). *Klin. Med. (Mosk.)* 55(11):81-84; 1977.

Clinical manifestations of hepatic coma were studied in 22 young and mature patients (18-44 yr, group 1) and in 37 elderly patients (60-89 yr, group 2) with clinically confirmed cirrhosis and chronic hepatitis. The duration of the comatose period was significantly greater in group 2 than in group 1 (27.0% of group 2 had coma lasting >10 days, compared with 9.0% of group 1, $p<0.05$). Hepatomegaly was detected in 40.5% of the patients in group 2, compared with only 14.0% of group 1 ($p<0.05$), while 54.5% of the patients in group 1 had splenomegaly, compared to 24.3% in group 2 ($p<0.05$). All patients died and postmortem examination showed a high incidence of concomitant complications: gastrointestinal hemorrhage (12 in group 1 and 10 in group 2), pneumonia (17 and 11, resp.), intestinal phlegmona (6 and 4, resp.), and ascites and peritonitis (5 and 3, resp.).

5653 DEFEROXAMINE-CHELATABLE IRON IN HEMOCHROMATOSIS AND OTHER DISORDERS OF IRON OVERLOAD. (Eng.) Baldus, W. P.; Fairbanks, V. F.; Dickson, E. R.; Baggenstoss, A. H. (Mayo Clinic, Rochester, MN). *Mayo Clin. Proc.* 53(3):157-165; 1978.

Deferoxamine-chelatable iron was measured in 103 patients with known or suspected iron overload, and in 16 healthy controls to provide a more precise estimate of radiation dosage. All of 34 patients with untreated hemochromatosis had distinctly elevated values for deferoxamine-chelatable iron. The mean value in these cases (2,565 ± 210.6

μg/kg) was significantly greater than that in the 20 patients with cirrhosis (505 ± 57.9 μg/kg, $p<0.01$), who had little or no stainable hepatic iron. In 15 patients with hemochromatosis who were tested sequentially during the course of phlebotomy therapy, deferoxamine-chelatable iron proved a reliable index of the degree of reduction of storage iron. In 22 additional patients with partially treated hemochromatosis and 14 with iron overload accompanying chronic anemia, this test correlated well with the magnitude of iron deposits in liver or bone marrow; the chelatable iron levels in these patients were 1,718 ± 323.9 and 949 ± 161.8 μg/kg, resp. In 13 patients with unexplained elevations of serum iron, normal or only slightly elevated deferoxamine-chelatable iron (482 ± 98.7 μg/kg) correctly indicated that storage (hepatic) iron was not excessive. The test was more reliable than was determination of serum iron or transferrin saturation as an indicator of increased storage iron. Elevated values could not be attributed to disturbed liver function. Determination of deferoxamine-chelatable iron is a safe, practical, and useful procedure for identifying persons with increased iron stores and for assessing the effect of phlebotomy therapy.

5654 CLINICAL POLYMORPHISM AND VARIANTS OF CERULOPLASMIN IN HEPATOLENTICULAR DEGENERATION. (Rus.) Vakharlovskii, V. G.; Moshkov, K. A.; Shavlovskii, M. M.; Neifakh, S. A. (Res. Inst. Experimental Medicine, Leningrad, USSR). *Genetika* 13(7):1294-1304; 1977.

To evaluate possible associations between the clinical polymorphism of hepatolenticular degeneration (Wilson's disease) and the structure of ceruloplasmin (CP), eight patients with Wilson's disease underwent extensive clinical and physicochemical examinations. All patients had a decreased blood level of CP (4.7-25.4 mg%, compared to 30 mg% in controls) and an elevated urinary excretion of CU (116-900 μg/day, instead of the normal 59.0 μg/day). Treatment with penicillamine resulted in clinical improvement, although the therapeutic doses and efficacy of treatment varied from patient to patient. At least two clinical variants of Wilson's disease were recognized: one with and one without visceral manifestations prior to the development of typical neurological symptoms. Analysis of the peptide maps of CP specimens showed distinct differences in peptide spectrum between the patients with different clinical variants of disease.

5655 DO LIVER TESTS PREDICT LIVER PATHOLOGY [Abstract]? (Eng.) Galambos, J. T.; Wills, C. (Emory Univ. Sch. Medicine, Atlanta, GA). *Gastroenterology* 72(5, Part 2):1060; 1977.

5656 COMPARISON OF ABDOMINAL SONOGRAM AND ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY IN THE DIAGNOSIS OF PANCREATIC AND BILIARY DISEASES [Abstract]. (Eng.) Lifton, L. J.; Kuskin, L. F. (Harrisburg Polyclinic Hosp., Harrisburg, PA). *Gastroenterology* 72(5, Part 2):1089; 1977.

5657 USEFULNESS OF PLASMA AMINO ACID MEASUREMENTS FOR ESTABLISHING ALCOHOLISM AS A CAUSE OF ABNORMAL LIVER CHEMISTRIES [Abstract]. (Eng.) Shaw, S.; Lue, S. L.; Lieber, C. S. (Bronx Veterans Admin. Hosp., Bronx, NY). *Gastroenterology* 72(5, Part 2):1171; 1977.

5658 PEDIATRIC GASTROENTEROLOGY 1/1/69-12/31/75: A REVIEW. PART II. THE LIVER AND BILIARY TRACT. (Eng.) Finley, A.; Andorsky, M.; Davidson, M. (Bronx-Lebanon Hosp. Center, 1650 Grand Concourse, Bronx, NY 10457). *Am. J. Dig. Dis.* 22(2):155-167; 1977.

5659 LIVER CELL ADENOMA AND HEPATIC HAMARTOMA--RECOGNITION, SIGNIFICANCE AND SURGICAL TREATMENT [Abstract]. (Eng.) Langer, B.; Stone, R. M.; Phillips, M. J.; Colapinto, R. F. (Dept. Surgery, Univ. Toronto, Toronto, Ontario, Canada). *Gastroenterology* 72(5, Part 2):1086; 1977.

5660 PATHOGENESIS OF LIVER CANCER. A NEW CONCEPT [Abstract]. (Eng.) Medline, A.; Solt, D.; Ogawa, K.; Farber, E. (Dept. PatHology, Univ. Toronto, Toronto, Ontario, Canada). *Gastroenterology* 72(5, Part 2):1172; 1977.

5661 CARCINOMA OF THE AMPULLA OF VATER: REVIEW OF 57 CASES [Abstract]. (Eng.) Lucke, D.; Schlippert, W.; Christensen, J.; Anuras, S. (Univ. Hosp., Iowa City, IA). *Gastroenterology* 72 (5, Part 2):1170; 1977.

5662 MEASUREMENT OF PRIMARY CONJUGATED BILE ACIDS IN THE SERA OF PATIENTS WITH LIVER NEOPLASM [Abstract]. (Eng.) Levy, N.; Mihas, A. A.; Hirschowitz, B. I. (Div. Gastroenterology, Univ. Alabama, Birmingham AL 35294). *Gastroenterology* 72(5, Part 2):1089; 1977.

5663 ALPHA-ANTITRYPSIN LEVELS IN PATIENTS WITH METASTATIC CARCINOMA OF THE LIVER [Abstract]. (Eng.) Setty, N.; Dubin, A.; Dourdourekas, D.; Steigmann, F. (Cook County Hosp., Chicago, IL). *Gastroenterology* 72(5, Part 2):1170; 1977.

5664 CUTANEOUS AND HEPATIC HAEMANGIOMATA. (Eng.) Robinson, D.; Hambleton, G. (Hammersmith Hosp., 150 Du Cane Rd., London W12 OHS, England). *Arch. Dis. Child* 52(2):155-157; 1977.

5665 ULTRASTRUCTURAL CHANGES IN HUMAN CHOLESTASIS: DIFFERENCIATION [sic] PROCESS OF THE LATERAL MEMBRANES OF HEPATOCYTES [Abstract]. (Eng.) Santalices, L.; Glasinovic, J. C.; Valdiviso, V. (Lab. Histology, Universidad Catolica, Santiago, Chile). *Gastroenterology* 72(5, Part 2): 1126; 1977.

5666 ASANGUINEOUS HYPOTHERMIC TOTAL BODY WASHOUT (TBW) [Abstract]. (Eng.) Tobias, H.; Ackert, J.; Isom, W. (New York Univ. Sch. Medicine, New York, NY). *Gastroenterology* 72(5, Part 2):1174; 1977.

5667 EMERGENCY TREATMENT OF ACUTE PORTAL-SYSTEMIC ENCEPHALOPATHY (PSE) WITH LACTULOSE ENEMAS: A CONTROLLED STUDY [Abstract]. (Eng.) Demeulenaere, L.; Van Waes, L.; van Egmond, J. (Dept. Medicine, St. Andrieskliniek, Tielt, Belgium). *Gastroenterology* 72(5, Part 2):1174; 1977.

5668 CORRELATION OF PLASMA TAURINE LEVELS WITH GRADES OF HEPATIC ENCEPHALOPATHY (HE) IN MAN [Abstract]. (Eng.) Rossi-Fanelli, F.; Capocaccia, L.; Fischer, J. E. (Dept. Medicine, Univ. Rome, Rome, Italy). *Gastroenterology* 72(5, Part 2):1181; 1977.

5669 POLYACRYLONITRILE MEMBRANE DIALYSIS FOR HEPATIC COMA [Abstract]. (Eng.) Ware, A.; Quarto di Palo, F.; Buccianti, G.; Polli, E. E. (Southwestern Medical Sch., Dallas, TX 75235). *Lancet* 2(8035):451-452; 1977.

5670 LIVER FAILURE WITH ALCOHOLIC-LIKE HYALINE AFTER JEJUNOILEAL BYPASS--REVERSAL BY PARENTERAL NUTRITION AND REANASTOMOSIS [Abstract]. (Eng.) Baker, A. L.; Elson, C. O.; Driscoll, R. H.; Boyer, J. L. (Dept. Medicine, Univ. Chicago, Chicago, IL). *Gastroenterology* 72(5, Part 2): 1170; 1977.

5671 PERICENTRAL HEPATIC FIBROSIS IN DIABETES MELLITUS [Abstract]. (Eng.) Falchuk, K. R.; Fiske, S.; Trey, C.; Haggitt, R.; Federman, M. (New England Deaconess Hosp., Boston, MA). *Gastroenterology* 72(5, Part 2):1174; 1977.

5672 FURTHER METABOLIC AND ENZYME STUDIES IN FAMILIAL HEPATIC GLYCOGEN SYNTHETASE (GS) DEFICIENCY [Abstract]. (Eng.) Aynsley-Green, A.; Williamson, D. H.; Gitzelmann, R. (Univ. Oxford, Oxford, England). *Pediatr. Res.* 11(9, Part 2):1015; 1977.

5673 HEPATITIS TRANSMISSION BY CEA POSITIVE BLOOD [Abstract]. (Eng.) Molnar, I. G.; Gitnick, G. L. (Univ. California, Los Angeles, CA). *Gastroenterology* 72(5, Part 2):1103; 1977.

5674 DIAGNOSIS AND MANAGEMENT OF HEPATIC TRAUMA. (Eng.) Mattox, K. L. (Baylor Coll. Medicine, Houston, TX). *Hosp. Med.* 13(3): 92-95, 98-100; 1977.

5675 SEX-LINKED NON-WILSONIAN COPPER STORAGE IN CHILDHOOD [Abstract]. (Eng.) Schneider-Saunders, F. C.; Ashwal, S. (No affiliation given). *Ann. Neurol.* 2(3):262; 1977.

See also, 5087, 5227, 5229, 5238, 5309, 5310, 5311, 5332, 5333, 5335, 5336, 5337, 5338, 5347, 5349, 5350, 5368, 5369, 5370, 5372, 5373, 5374, 5375, 5508, 5599, 5694, 5699, 5701, 5707, 5727, 5729, 5736, 5737, 5744, 5748, 5776, 5780, 5811, 5813, 5834, 5836.

LIVER AND BILIARY TRACT

Hyperbilirubinemic States

5676 ELECTRORETINOGRAPHY IN NEONATES TREATED WITH PHOTOTHERAPY. (Eng.) Bhupathy, K.; Sethupathy, R.; Pildes, R. S.; Constantaras, A. A.; Fournier, J. H. (Cook County Hosp., Chicago, IL). *Pediatrics* 61(2):189-192; 1978.

To evaluate the possible retinotoxic effects of phototherapy given in the neonatal period, electroretinographic (ERG) studies were carried out in 22 normal control neonates and 28 neonates who had had phototherapy with ocular shielding during the first few days of life. The mean age of ERG testing was 16.8 ± 2.9 days in the phototherapy group and 16.4 ± 3.7 days in the controls. The results of routine funduscopy were normal in both groups. Amplitudes of a and b waves under dark- and light-adapted states were similar in both groups. Phototherapy does not appear to have deleterious effects on photopic and scotopic retinal function in infants whose eyes are adequately shielded.

5677 NEONATAL JAUNDICE IN GREEK IMIGRANTS [Letter to Editor]. (Eng.) Valaes, T.; Drew, J. H.; Kitchen, W. H. (Tufts-New England Medical Center Hosp., Boston, MA 02111). *J. Pediatr.* 91(6):1030-1032; 1977.

See also, 5207, 5211.

5678 HEPATIC INJURY AND DRUG METABOLISM IN PATIENTS WITH ALPHA-METHYLDOPA-INDUCED LIVER DAMAGE. (Eng.) Sotaniemi, E. A.; Hokkanen, O. T.; Ahokas, J. T.; Pelkonen, R. O.; Ahlqvist, J. (Dept. Internal Medicine, Univ. Oulu, SF-90220 Oulu 22, Finland). *Eur. J. Clin. Pharmacol.* 12(6): 429-435; 1977.

The clinical picture and drug metabolism in 36 consecutive patients with alpha-methyldopa-induced liver injury and 11 controls were investigated. The diagnosis was based on case history and biochemical, histological, and follow-up studies after drug withdrawal. Alpha-methyldopa-induced liver damage was found to occur in two phases, acutely within months (3.4 ± 0.4 months) or chronically within years (36.5 ± 2.9 months, $p<0.001$) after beginning treatment. Differences were also found in clinical symptoms and the results of liver tests on the patients if they were divided on the basis of the time factor. Drug metabolism was impaired in patients with alpha-methyldopa-induced liver damage, as indicated by low cytochrome P-450 level in liver biopsies (5.7 ± 0.73 versus 10.6 ± 5 nmol/g in controls, $p=0.001$) and prolonged antipyrine elimination rate from plasma ($T_{1/2}$=14.2 ± 1.18 hr versus 8.8 ± 0.5 hr in controls). Disappearance of the symptoms and normalization of the liver tests after drug withdrawal occurred faster in patients with an acute type of hepatotoxicity than in subjects with delayed onset of the symptoms. The occurrence of hepatotoxicity in four members of a family suggests a genetic disposition to alpha-methyldopa-induced hepatic injury. The occurrence of two phases of liver damage suggests that a possible mechanism for acute hepatotoxicity might be an allergic reaction to metabolic intermediates produced during breakdown of alpha-methyldopa in the liver. For cases of delayed onset, the cause might be increasing damage to microsomal liver protein due to covalent binding during long-term exposure to the drug.

5679 ASPIRIN HEPATOTOXICITY. (Eng.) Kanada, S. A.; Kolling, W. M.; Hindin, B. I. (16269 Sierra Ridge Way, Hacienda Heights, CA 91745). *Am. J. Hosp. Pharm.* 35(3):330-336; 1978.

A case of aspirin hepatotoxicity in a 46-yr-old man with rheumatoid arthritis is presented. The patient was started on 900 mg aspirin q.i.d.; 5 days later, the dose was increased to 1,200 mg q.i.d. After 6 days of 4.8 g aspirin/day, the serum salicylate level rose to 25 mg/100 ml, and liver enzymes became elevated. Aspirin was discontinued, and ibuprofen (600 mg q.i.d.) was begun. Eight days after the cessation of aspirin therapy, the patient's liver enzyme values returned to normal. This case and others in the literature suggest that aspirin-induced hepatotoxicity occurs much more frequently in patients with rheumatoid arthritis and other connective tissure disorders than has been previously recognized.

5680 SCINTIGRAPHY OF LIVER AND SPLEEN IN VINYL CHLORIDE WORKERS. (Eng.) Biersack, H. J.; San Luis, T., Jr.; Lange, C. E.; Thelen, M.; Veltman, G.; Winkler, C. (Institut fur klinische und experimentelle Nuklearmedizin, 5300 Bonn-Venusberg, W. Germany). *Acta Hepatogastroenterol. (Stuttg.)* 24(5):357-361; 1977.

In 152 vinyl chloride (VC)-exposed workers of whom 124 were employed in polyvinyl chloride (PVC) production and 28 in VC processing plants, liver and spleen imaging was performed using ^{99m}Tc-sulfur colloid and ^{197}Hg-BMHP, to test this procedure as a noninvasive screening method for liver disease resulting from PVC exposure. In 101/124 workers in the PVC production plant and in 18/28 workers in VC processing factories, pathological liver and spleen scintigrams were found. The most frequent scintigraphic change was an increase in splenic colloid accumulation, when compared with the liver uptake. Three angiosarcomas of the liver were detected through circumscribed defects of colloid accumulation. Sequential liver scintigraphy was carried out in 15 cases. In seven patients with esophageal varices, considerable decrease in portal venous blood flow was demonstrated. This study suggests that scintigraphically detectable changes are sensitive indicators of VC induced hepatic lesions, including liver fibrosis, portal hypertension, and angiosarcoma.

5681 THE LIVER AND INDUSTRIAL POISONS. CLINICAL AND BIOLOGICAL ASPECTS. (Fre.) Efthymiou, M. L. (Hopital Fernand Widal, 200, rue du Faubourg Saint-Denis, 75010 Paris, France). *Arch. Mal. Prof. Med. Trav. Secur. Soc.* 38(1/2): 237-257; 1977.

5682 DETECTION OF HEPATOBILIARY DISEASES IN INDUSTRIAL MEDICINE. (Fre.) Jouanneau, C. (Service scientifique, Boehringer Mannheim, France S.A., 7, boulevard de la Madeleine, 75001 Paris, France). *Arch. Mal. Prof. Med. Trav. Secur. Soc.* 38(1/2):273-274; 1977.

Acute Viral Hepatitis

5683 VIRAL HEPATITIS: ADVANCES, PROSPECTS, DOUBTS, AND PROBLEMS. (Rus.) Ananiev, V. A.; Stakhanova, V. M.; Zhdanov, V. M. (D. I. Ivanovskii Inst. Virology, Moscow, USSR). *Vestn. Akad. Med. Nauk SSSR* (9):3-6; 1977.

Various problems pertaining to the etiology of viral hepatitis are discussed. Discovery of the Australia antigen (HBsAg) and development of various assays for its identification markedly reduced the risk of infection by post-transfusion hepatitis. The use of true tissue chimeras (cultivation of the infected human tissues on the chorioallantoic membrane of the chick embryo) revealed the presence of HBsAg in 24/49 patients with viral hepatitis, 11/21 blood donors, 1/1 patient with acute respiratory disease, and 2/3 patients with chronic renal insufficiency. Further research and development of sophisticated analytical assays are necessary to understand the nature of HBsAg.

5684 DETECTION OF ATYPICAL FORMS OF VIRAL HEPATITIS BY DETERMINATION OF LACTATE DEHYDROGENASE ISOENZYMES. (Rus.) Tsarapkin, M. I. (No affiliation given). *Vrach. Delo* (7):145-148; 1977.

To improve the differential diagnosis of anicteric viral hepatitis, the activities of lactate dehydrogenase (LDH) isozymes were determined (by electrophoresis in agar gels) in 380 patients with the provisional diagnoses of functional gastric disturbance (116), acute gastritis (74), chronic gastritis (96), food poisoning (9), relapse of chronic cholecystitis (42), acute enterocolitis (14), chronic enterocolitis (8), catarrhal angina (6), and chronic tonsillitis (15). Of these patients, 26/380 had increased activity of LDH5 (22.0%, compared with 9.7% in healthy controls); 22/26 patients also had increased activity of LDH4 (14.5%, compared to 8.3% in controls). Further examination showed that 14/26 patients with increased LDH5 activity had an atypical variant of viral hepatitis, and 3/26 had the anicteric variant of virus hepatitis.

5685 PATHOGENESIS AND TREATMENT OF SEVERE FORMS OF VIRAL HEPATITIS IN CHILDREN. (Rus.) Nisevich, N. I.; Uchaikin, V. F. (N. I. Pirogov Second Medical Inst., Moscow, USSR). *Vestn. Akad. Med. Nauk SSSR* (9):35-42; 1977.

To evaluate the role of metabolic processes in the pathogenesis of massive necroses and hepatic coma in viral hepatitis, various groups of children with severe forms of viral hepatitis underwent extensive biochemical examination. Lipid peroxidation was studied in 112 patients (24 had severe form, 54 had medium severity of disease, and 34 had mild hepatitis). The evaluation of the malonic dialdehyde content was proportional to the severity of disease (the patients with mild hepatitis showed 2.1-fold increase compared with 5.6-fold increase in the patients with severe hepatitis). The state of the lysosomal and proteolysis apparatus was studied in 193 patients (36 had severe disease). Development of hepatic coma in the patients with hepatodystrophy was associated with the increased activity of trypsin-like proteinases and, subsequently, with increased formation of active kinins. Analysis of 153 patients revealed the presence of antibodies against liver in the serum of 60% of the patients, antibodies against kidney tissue in 21.7% of the patients, and antibodies against smooth muscles in 26.4% of the patients; the titers of organ antibodies decreased with the severity of disease (antibodies could not be detected during coma).

5686 HEPATITIS B IN CHILDREN. I. ANALYSIS OF 80 CASES OF ACUTE AND CHRONIC HEPATITIS B. (Eng.) Dupuy, J. M.; Kostewicz, E.; Alagille, D. (INSERM, Hopital d'Enfants, 94270 Bicetre, France). *J. Pediatr.* 92(1):17-20; 1978.

To study the natural course of hepatitis B uncomplicated by liver disorders of other causes, the transmission, clinical features, and presence of hepatitis B surface antigen (HBsAg) and antibody (anti-HBs) were investigated in 80 children who had hepatitis B between 1971 and 1975. The diagnosis was based upon the detection in serum of HBsAg and/or the secondary occurence of anti-HBs. Thirty-one patients presented with acute viral hepatitis, 16 with severe or fulminant hepatitis, 17 with chronic persistent hepatitis, 12 with chronic active hepatitis, and 4 were asymptomatic chronic carriers of HBsAg. Twenty-nine of 80 children were under 1 yr of age, the peak of frequency occurring from 2 to 5 months. HBsAg was detected in the serum at the onset of the disease in 12/16 patients with severe hepatitis, and 10/16 died. The source of infection, determined in 27 of 29 infants, was administration of blood derivatives in 15 cases and contact with an HBsAg-carrier mother in 9 instances. In the latter type, the incubation time (103 days) was compatible with a p.o. route of infection. Persistent antigenemia occurred in only 3 of 29 patients. The overt type of disease developed by most infants, as well as the small number of patients who became HBsAg carriers, suggest that the carrier state, often encountered in neonatally infected infants in other countries, may be related to environmental or genetic factors rather than to immaturity of the immune system.

5687 HEPATITIS B IN CHILDREN. II. STUDY OF CHILDREN BORN TO CHRONIC HBsAg CARRIER MOTHERS. (Eng.) Dupuy, J. M.; Giraud, P.; Dupuy, C.; Drouet, J.; Hoofnagle, J. (INSERM, Hopital d'Enfants, 94270 Bicetre, France). *J. Pediatr.* 92(2):200-204; 1978.

The apparently high rate of hepatitis B transmission but low rate of developing the chronic carrier

state of hepatitis B surface antigen (HBsAg) among infants born to chronic HBsAg carriers prompted a prospective study of infants born to chronic carriers who were detected in a routine HBsAg screening program. A survey of 4,452 pregnant women revealed 28 asymptomatic chronic carriers. At birth, 16 of 17 infants studied were HBsAg-negative whereas antibody to hepatitis B core antigen (anti-HBc) was present in all patients at a titer similar to that of the mother. Twelve children were followed for 6 to 18 months. In four of them, HBsAg remained negative and anti-HBc titers progressively decreased and were undetectable when tested after the age of 6 months. In eight infants, HBsAg became positive after an average of 48 days. Elimination of HBsAg occurred in seven infants; five of them had clinical and biological manifestations of mild hepatitis. Sequential determinations of total complement (C) and C components in three patients in the latter group showed depression of complement at the time that clinical manifestations appeared. In the patient who became an HBsAg carrier, as well as in three infants who remained HBsAg-negative, no decrease in complement titers was observed. These results indicate that vertical transmission from carrier mothers can occur in a low prevalence area and that neonatally infected children are capable of active elimination of the hepatitis B virus.

5688 EPIDEMIOLOGY OF HEPATITIS B SURFACE ANTIGEN (HBsAg) AND ANTIBODY TO HBsAg IN HOSPITALIZED PERSONNEL. (Eng.) Janzen, J.; Tripatzis, I.; Wagner, U.; Schlieter, M.; Muller-Dethard, E.; Wolters, E. (Medizinische Hochschule Hannover, Karl-Wiechert-Allee 9, D-3000 Hannover 61, W. Germany). *J. Infect. Dis.* 137(3):261-265; 1978.

The epidemiology of hepatitis B in hospital personnel was studied by testing sera from 3,770 employees of the Hannover Medical School for hepatitis B surface antigen (HBsAg) and its antibody (anti-HBs) by solid-phase radioimmunoassay. An overall prevalence of 2.2% for HBsAg and 11.7% for anti-HBs was found. Physicians (18.2%), nurses (20.1%), and members of the cleaning service (26.3%) showed the highest frequencies of HBsAg or anti-HBs carriage. In a study of age- and sex-matched personnel, nurses showed a significantly ($p<0.01$) higher rate of infection than did a control group with less exposure to infectious materials. The frequency of HBsAg or anti-HBs was highest in persons associated with dialysis (31.3%), anesthesiology (31.0%), ophthalmology (29.4%), neurosurgery (28.0%), and surgery (24.4%). The rate of infection was significantly ($p<0.01$) higher in surgical departments (24.4%) than in nonsurgical ones (13.3%). Persons who had been nursing patients with hepatitis were significantly ($p<0.05$) more frequently carriers of HBsAg or anti-HBs than was a comparable control group. There was a correlation between the prevalence of HBsAg and age: of the personnel who were 20 yr old or younger, only 4.1% were HBsAg or anti-HBs carriers, whereas 37.2% of those 51 yr or older were HBsAg or anti-HBs carriers ($p<0.001$). The members of medical professions showed a rate 1.5% higher than that for the total personnel. The high rate of infection in the cleaning service may be related to the fact that this group had the oldest persons (average age, 38.6 yr), and the low infection rate seen in medical technicians (11.1%) may be related to their young age (28.2 yr). Low rates observed in medical students (10.8%), student nurses (5.3%), and student technicians (6.7%) can be explained by their age and less intensive exposure.

5689 CHARACTERISTICS OF BLOOD CLOTTING IN CHOLESTATIC FORMS OF VIRAL HEPATITIS. (Rus.) Fedenko, Iu. I. (Voroshilovgrad Municipal Hosp. No. 4, Voroshilovgrad, USSR). *Klin. Med. (Mosk.)* 45(10):76-82; 1977.

The state of blood clotting was studied in 104 patients with various forms of viral hepatitis. The patients were divided into three groups: group 1 included 43 patients with typical viral hepatitis, group 2 included 42 patients with hepatitis with a cholestatic component, and group 3 included 9 patients with a cholestatic variant of viral hepatitis. The patients in groups 1 and 2 had marked hypocoagulation due to decreased level of procoagulants and increased activity of anticoagulants; these changes were more pronounced during the acute period of disease (fibrinolytic activity in groups 1 and 2 was 212.0 ± 5.3 min and 206.9 ± 15.5 min compared to 300.0 ± 7.7 min in healthy controls, $p<0.001$). The acute period of cholestatic hepatitis was not associated with disturbances in blood clotting, although prolonged cholemia induced changes similar to those in groups 1 and 2.

5690 OCCURRENCE OF COLD-REACTIVE ANTILYMPHOCYTE ANTIBODIES IN ACUTE VIRAL HEPATITIS. (Eng.) Marchesini, G.; Forlani, G.; Pisi, E. (Istituto di Patologia Medica I, Universita de Bologna, Policlinico S. Orsola, Via Massarenti 9, 40138 Bologna, Italy). *Rend. Gastroenterol.* 9(3):185-188; 1977.

The presence of cold-reactive antibodies directed against membrane antigen(s) of normal non-B lymphocytes was investigated in hepatitis B surface antigen (HBsAg)-positive and -negative acute viral hepatitis (AVH). The number of surface Ig-positive cells from six healthy donors with different histocompatibility antigens was evaluated after incubation with test sera or saline as control. Fifteen of 19 HBsAg-positive and 14 of 17 HBsAg-negative AVH sera, obtained at onset of the disease, were positive for the presence of antibodies reacting with surface antigens of lymphocytes, as were about 40% of the sera obtained when serum bilirubin and SGPT had returned to normal levels. Cold-reactive antilymphocyte antibodies probably account for the known lymphocytotoxic activity of AVH sera, as demonstrated in other viral infections.

5691 TYPE B HEPATITIS AFTER NEEDLE-STICK EXPOSURE: PREVENTION WITH HEPATITIS B IMMUNE GLOBULIN. FINAL REPORT OF THE VETERANS ADMINISTRATION COOPERATIVE STUDY. (Eng.) Seeff, L. B.;

Wright, E. C.; Zimmerman, H. J.; Alter, H. J.; Dietz, A. A.; Felsher, B. F.; *et al.* (Veterans Admin. Hosp., 50 Irving St. NW, Washington, DC 20422). *Ann. Intern. Med.* 88(3):285-293; 1978.

In a randomized, double-blind trial, the relative efficacies of hepatitis B immune globulin (HBIG) and immune serum globulin (ISG) in preventing type B hepatitis after needle-stick exposure to hepatitis B surface antigen (HBsAg) were analyzed. The HBsAg-exposed subjects received a 5-ml i.m. injection of either HBIG (anti-HBs titer of 1:100,000 by passive hemagglutination), or of ISG (anti-HBs titer <1.8). Clinical hepatitis developed in 1.4% of the 216 subjects who received HBIG and in 5.9% of 203 ISG recipients ($p=0.016$), and seroconversion (anti-HBs) occurred in 5.6% and 20.7% of them, resp. ($p<0.001$). Mild and transient side-effects were noted in 3.0% of ISG and in 3.2% of HBIG recipients. Available donor sera were examined for DNA polymerase (DNAP) and e antigen and antibody (HBeAg; anti-HBe). Both DNAP and HBeAg showed a highly significant correlation with the infectivity of HBsAg-positive donors; type B hepatitis and all type B events occurred more frequently in those exposed to DNAP-positive sera or to HBeAg-positive sera as opposed to negative sera ($p=0.003$). HBIG remained significantly superior to ISG in preventing type B hepatitis, even when the analysis was confined to these two high-risk subgroups ($p=0.02$). The efficacy of ISG in preventing type B hepatitis cannot be ascertained because a true placebo group was not included.

5692 TRANSMISSIBLE AGENT IN NON-A, NON-B HEPATITIS. (Eng.) Alter, H. J.; Holland, P. V.; Purcell, R. H.; Popper, H. (Natl. Inst. Health Clinical Center, Blood Bank Dept., Bethesda, MD 20014). *Lancet* 1(8062):459-465; 1978.

Plasma or serum from four patients with acute or chronic non-A, non-B post-transfusion hepatitis (PTH) and from a blood-donor implicated in two cases of PTH was inoculated into five chimpanzees in an effort to find a transmissible agent for this disease. Biochemical and histological evidence of hepatitis developed in all five chimpanzees but not in a control animal. The mean incubation period in the chimpanzees was 13.4 weeks, compared with 7.7 weeks in the four patients with PTH. The peak alanine aminotransferase (ALT) levels in the five chimpanzees were 265, 212, 219, 70, and 62 IU/l. Histological changes ranged from mild to conspicuous hepatitis and generally correlated with the degree of ALT elevation. There was no evidence of clinical disease, and all animals went on to biochemical and histological recovery. There was no serological evidence of type A or type B hepatitis. Hepatitis was transmitted by serum derived from patients with chronic as well as acute hepatitis, strongly suggesting a chronic carrier state for the agent responsible for non-A, non-B hepatitis. Non-A, non-B hepatitis thus seems to be due to a transmissible agent that can persist and remain infectious for long periods.

5693 TRANSFER FACTOR IN THE ATTEMPTED TREATMENT OF PATIENTS WITH HBsAg-POSITIVE CHRONIC LIVER DISEASE. (Eng.) Jain, S.; Thomas, H. C.; Sherlock, S. (Royal Free Hosp., Pond St., London NW3 2QG, England). *Clin. Exp. Immunol.* 30(1):10-15; 1977.

To determine whether immunity to hepatitis B virus-related antigens can be restored or influenced by the administration of transfer factor (TF), six patients with hepatitis B surface antigen-positive (HBsAg-pos) chronic liver disease were treated with TF prepared from WBC of normal blood donors without history of hepatitis (nonspecific TF) and with TF from subjects recently recovered from type B hepatitis (specific TF). In three patients, there were transient elevations of aspartate transaminase (AsT) after specific TF, representing damage or destruction of hepatocytes, and in two of these patients there was coincidental complement consumption, suggesting that TF had stimulated production of antibody. In one other patient there was an increase in E-rosetting lymphocyte concentration, representing a change in T-lymphocyte reactivity. One of the two patients who had no measured response to TF had a primary liver cell carcinoma and was receiving prednisolone therapy. TF prepared from subjects who have recently recovered from type B hepatitis may have temporarily altered the immunological status of patients with HBsAg-pos chronic liver disease, but it did not have a beneficial therapeutic effect.

5694 HEPATITIS B ANTIGEN AND THE LIVER. (Eng.) Mihas, A. A.; Conrad, M. E. (Dept. Medicine, Univ. Alabama Birmingham, Birmingham, AL 35294). *Medicine* 57(2):129-150; 1978.

Studies involving the morphology, biophysical properties, detection, epidemiology, and carrier state of the hepatitis B surface antigen (HBsAg), and its relationship to liver diseases and to other antigen-antibody systems are reviewed. Antigens that have been associated with hepatitis type B include both HBsAg and a core antigen (HBcAg). Antigenic subtypes of HBsAg have been identified and are useful in epidemiologic studies; the presence of "e" antigen may be associated with the development of chronic liver disease. Blood and other biologic fluids containing HBsAg transmit hepatitis type B by parenteral and nonparenteral routes. Carriers of HBsAg are more prevalent in lower socioeconomic groups. The carrier state is more common following anicteric hepatitis, and this may be related to the carriers' inability to develop a cellular immune response. Persistence of HBsAg has been related to polyarteritis, glomerulonephritis, cirrhosis, chronic active hepatitis, and hepatoma. However, the majority of carriers of HBsAg are asymptomatic. Elimination of HBsAg carriers as blood donors has markedly diminished transmission of hepatitis B by transfusion, so that other viral agents are now the most important cause of post-transfusion hepatitis. The prophylactic administration of human serum gamma globulin-containing antibody to HBsAg seems to de-

crease the occurrence of hepatitis type B following nonparenteral exposure. There is no convincing evidence that it decreases occurrence following parenteral exposure. Preliminary studies indicate that active immunization is feasible and would provide a safe and effective method of preventing hepatitis type B transmission and its complications.

5695 DETERMINATION OF VIRAL HEPATITIS B ANTIGEN IN LIVER AND PERIPHERAL BLOOD IN CHRONIC LIVER DISEASES. (Rus.) Loginov, A. S.; Aruin, L. I.; Tsaregorodtseva, T. M.; Gorodinskaia, V. S.; Zotina, M. M.; Tkachev, V. D. (Central Res. Inst. Gastroenterology, Moscow, USSR). *Ter. Arkh.* 50(2): 32-36; 1978.

The incidence of viral hepatitis B antigen (HBAg) in the liver tissue and peripheral blood was studied in 98 patients with various chronic liver lesions. HBAg in liver specimens obtained at biopsy was assayed by staining with orsein dye; serum HBAg was assayed by immunoelectrophoresis and double immunodiffusion. Orsein-positive hepatocytes were observed in 7/22 patients with cirrhosis, 4/21 patients with active hepatitis, 0/7 patients with persistent hepatitis, 0/4 patients with posthepatitis state, 0/5 patients with reactive hepatitis, 0/9 patients with fatty dystrophy, 0/22 patients with lipofuscinosis, and 1/1 patient with cancer of the bile duct. In 70% of the patients (predominantly those with cirrhosis or active hepatitis), persistence of HBAg in the blood serum coincided with the presence of antigen-containing hepatocytes.

5696 T-LYMPHOCYTE CYTOTOXICITY TO HBsAg-COATED TARGET CELLS IN HEPATITIS B VIRUS INFECTION. (Eng.) Alberti, A.; Realdi, G.; Bortolotti, F.; Rigoli, A. M. (Istituto di Medicina Clinica, Cattedra di Patologia Medica, via Giustiniani 1, 35100 Padova, Italy). *Gut* 18(12):1004-1009; 1977.

The cytotoxic effect of peripheral lymphocytes on chicken RBC (ChRBC) coated with purified hepatitis B surface antigen (HBsAg) was studied as an *in vitro* parameter of cell-mediated immunity in acute and chronic infection with hepatitis B virus. Using this technique, the mean cytotoxic index of lymphocytes from 23 patients with acute hepatitis B (29.13 ± 20.88) was significantly higher than that obtained with lymphocytes from 15 controls (6.53 ± 3.75, $p<0.001$). Only 33.3% of the 12 patients with HBsAg-positive chronic active hepatitis exhibited lymphocyte cytotoxicity to HBsAg-coated target cells, and the mean cytotoxic index (11.66 ± 6.60) was in these cases significantly lower than that found in acute hepatitis B ($p<0.005$). All 10 healthy chronic carriers of HBsAg failed to show lymphocyte cytotoxicity to target cells. The effector cells detected in acute hepatitis B by this *in vitro* assay were demonstrated to be T-lymphocytes, as T-cell depleted subpopulations lacked cytotoxic activity. Target cell lysis was blocked by the addition of HBsAg-coated unlabeled ChRBC as well as of purified HBsAg in the culture tubes. It is suggested that damage to the liver cells in acute hepatitis B is related to the presence of cytotoxic T-lymphocytes reacting with HBsAg on the surface of infected hepatocytes. An inadequate lymphocyte response to the antigen may be responsible for the persistence of the infection in the liver with varied clinical manifestations and associated hepatic lesions.

5697 ANTI-HBc, HBeAg AND DNA POLYMERASE ACTIVITY IN HEALTHY HBsAg CARRIERS AND PATIENTS WITH INFLAMMATORY LIVER DISEASES. (Eng.) Arnold, W.; Hess, G.; Purcell, R. H.; Kaplan, P. M.; Gerin, J. L.; Meyer zum Buschenfelde, K. H. (Freie Universitat Berlin, Klinikum Charlottenburg, Spandauer Damm 130, D-1000 Berlin 19, W. Germany). *Klin. Wochenschr.* 56(6):297-303; 1978.

Antibody titers to hepatitis B core antigen (anti-HBc) were analyzed in healthy hepatitis B surface antigen (HBsAg)-carriers and patients with chronic inflammatory diseases. In addition, the relationships between the presence of hepatitis B e antigen (HBeAg) and DNA polymerase activity and the presence of inflammatory liver disease or the HBsAg carrier state, anti-HBc titers in the serum, and intracellular HBsAg were investigated in healthy HBsAg-carriers and patients with HBsAg-positive inflammatory liver diseases. Thirty-two of 44 patients with acute virus B hepatitis were negative for anti-HBc in the first week of the disease. Anti-HBc-titers in healthy HBsAg-carriers varied between 1:10 and 1:32,000 (medium titer 1:4,000). In HBsAg-positive chronic active hepatitis (CAH), a medium titer between 1:32,000 and 1:64,000 was found; in patients with chronic persistent hepatitis (CPH), a titer of about 1:16,000 was found. All autoimmune type CAH showed anti-HBc-titers less than 1:10. By immunofluorescence, HBcAg was demonstrated in 71 asymptomatic HBsAg-carriers but in none of the healthy HBsAg-carriers. In contrast, HBcAg was only found in four of five HBsAg-positive CAH and six of nine CPH patients. No elevated DNA polymerase activity was demonstrated in healthy HBsAg-carriers. Among 44 patients with virus B hepatitis, only 3 showed elevated DNA polymerase activity. On the other hand, DNA polymerase elevation was demonstrable in 17 of 37 cases of CAH and 9 of 15 with CPH. The investigations showed a strong correlation between the demonstration of serum HBcAg and the DNA polymerase activity. The characteristic findings enable differentiation between "healthy" HBsAg-carriers and HBsAg-carriers with inflammatory liver diseases.

5698 LOCALISATION OF e-ANTIGEN IN NUCLEI OF HEPATOCYTES IN HBsAg-POSITIVE LIVER DISEASE. (Eng.) Arnold, W.; Nielsen, J. O.; Hardt, F.; Meyer zum Buschenfelde, K. H. (Freie Universitat Berlin, Klinikum Charlottenburg, 1000 Berlin 19, W. Germany). *Gut* 19(12):994-996; 1977.

Liver biopsies from 13 patients with hepatitis B surface antigen (HBsAg)- and e antigen-positive chronic active hepatitis (CAH), 4 HBsAg- and e antigen-positive patients on chronic hemodialysis, and 2 patients with antigen-negative CAH (controls)

were examined using the direct immunofluorescence technique, to determine the intracellular localization of the e antigen. The e antigen was demonstrated in 13 of 14 patients with HBsAg/e antigen-positive CAH and in all 4 patients on hemodialysis. The antigen was consistently found in the nuclei and never in the cytoplasm of hepatocytes. Preincubation with unlabeled antibody to hepatitis B core antigen (anti-HBcAg) before incubation with either anti-HBc-fluorescein isothiocyanate (FITC) or anti-HBc-Rhodamine showed complete blockage of HBcAg-specific fluorescence. After preincubation with unlabeled anti-HBcAg followed by incubation with anti-e-FITC or -Rhodamine, a bright fluorescence for intranuclear e antigen was revealed. There was no evidence for e antigen in the cytoplasm, although almost 20% of the hepatocytes had HBsAg in their cytoplasm after incubation with anti-HBs-FITC. These results indicate that the e antigen is localized in the nuclei of the hepatocytes. The authors conclude that the e antigen and the core antigen are not identical, although they are often present simultaneously in the nucleus of the hepatocyte.

5699 IMMUNOFLUORESCENCE DETECTION OF NEW ANTIGEN-ANTIBODY SYSTEM (δ/ANTI-δ) ASSOCIATED TO HEPATITIS B VIRUS IN LIVER AND IN SERUM OF HBsAg CARRIERS. (Eng.) Rizzetto, M.; Canese, M. G.; Arico, S.; Crivelli, O.; Trepo, C.; Bonino, F.; Verme, G. (Ospedale Mauriziano Umberto I, Cs. Turati 46, 10128 Turin, Italy). *Gut* 18(12):997-1003; 1977.

A new antigen-antibody system associated with the hepatitis B virus and immunologically distinct from the hepatitis B surface, core, and e systems is reported. The new antigen, termed δ, was detected by direct immunofluorescence only in the liver cell nuclei of patients with hepatitis B surface antigen (HBsAg) positive chronic liver disease. At present, the intrahepatic expression of hepatitis B core antigen (HBcAg) and δ antigen appears to be mutually exclusive. No ultrastructural aspect corresponding to the δ antigen could be identified. δ Antibody was found in the serum of chronic HBsAg carriers, with a higher prevalence in patients with liver damage. The nuclear fluorescence patterns of HBcAg and δ antigen were similar; it is only possible to discriminate between the two antigens by using the respective specific antisera.

5700 NEONATAL HEPATITIS B INFECTION. A LONGITUDINAL STUDY OF EIGHT CASES [Abstract]. (Eng.) Skinhoj, P. (Rigshospitalet, Copenhagen, Denmark). *Digestion* 16(4):361; 1977.

5701 INTERNATIONAL WORKSHOP ON HEPATITIS B AND LIVER CANCER: SPECIAL REPORT. (Eng.) Ziegler, J. L.; Adamson, R. H.; Barker, L. F.; Fraumeni, J. F., Jr.; Gerin, J.; Purcell, R. H. (Clinical Oncology Program, Natl. Cancer Inst., Natl. Inst. Health, Bethesda, MD 20014). *J. Natl. Cancer Inst.* 60(3):717; 1978.

5702 TEMPLATE BLOCKADE OF HEPATITIS B VIRUS, A NEW APPROACH TO THERAPY [Abstract]. (Eng.) Hirschman, S. Z. (Mt. Sinai Sch. Medicine, New York, NY 10029). *Gastroenterology* 73(5):1225; 1977.

5703 REPEATED TYPE B HEPATITIS INFECTIONS: TEN CASES STUDIED PROSPECTIVELY [Abstract]. (Eng.) Schulman, A. N.; Fagen, N. D.; Ling, C. M.; Overby, L. R.; Morton, D. L.; Gitnick, G. L. (Univ. California, Los Angeles, CA). *Gastroenterology* 72 (5, Part 2):1182; 1977.

5704 THE UTILIZATION OF PLASMA LIPOPROTEIN (Lp) ELECTROPHORESIS IN THE ASSESSMENT OF LIVER INJURY IN VIRAL HEPATITIS [Abstract]. (Eng.) Hawkins, H. L.; Davidson, O. L., III; Sabesin, S. M. (Univ. Tennessee Center Health Sciences, Memphis, TN). *Gastroenterology* 72(5, Part 2):1068; 1977.

5705 IMMUNOELECTRON MICROSCOPIC STUDY OF HEPATITIS B ANTIGENS IN LIVER TISSUE [Abstract]. (Eng.) Huang, S. N. (Dept. Pathology, McGill Univ., Montreal, Quebec, Canada). *Gastroenterology* 72(5, Part 2):1181; 1977.

5706 DEMONSTRATION IN THE SERUM AND LIVER OF HEPATITIS B SURFACE ANTIGEN (HBsAg) CARRIERS OF TWO DISTINCT COMPONENTS OF THE eAg COMPLEX AND DESCRIPTION OF A NEW IMMUNOFLUORESCENCE TEST FOR THE DETECTION OF AN e NUCLEAR ANTIGEN APPARENTLY LINKED TO DNA POLYMERASE [Abstract]. (Eng.) Trepo, C.; Hantz, O.; Trepo, D.; Chevalier, P.; Vitvitski, L.; Sepetjian, M.; Brette, R. (INSERM U 45, Hopital Edouard-Herriot, 69374 Lyon, France). *Digestion* 15(5):445-446; 1977.

See also, 5333, 5335, 5645, 5651, 5673, 5714, 5716, 5717, 5719, 5764, 5839.

LIVER AND BILIARY TRACT

Chronic Hepatitis

5707 INVESTIGATION OF COLLAGEN METABOLITES IN CHRONIC DIFFUSE DISEASES OF THE LIVER. (Rus.) Komarov, F.; Suchkov, A.; Pogromov, A. (I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Klin. Med. (Mosk.)* 55(11):62-67; 1977.

In an attempt to develop new clinical-laboratory criteria for the activity of fibrinogenesis in chronic liver lesions, the content of collagen metabolites was determined in the blood and urine of 129 patients (85 with cirrhosis, 19 with liver

steatosis, 15 with chronic persistent hepatitis, and 10 with chronic active hepatitis). The patients with chronic active hepatitis had elevated urinary excretion of free and protein-bound hydroxyproline (2.83 and 61.01 mg/day, resp., compared with 1.22 and 20.45 mg/day in healthy controls) and an elevated level of protein-bound plasma hydroxyproline (13.98, compared to 8.50 µg/ml in controls). The patients with cirrhosis had elevated urinary excretion of free and protein-bound hydroxyproline (3.50 and 38.95 mg/day, resp.) and an increased content of plasma protein-bound hydroxyproline (13.10 µg/ml). The difference between the patients with chronic persistent hepatitis or with liver steatosis and the healthy controls was not statistically significant.

5708 PULMONARY VENTILATION, GAS EXCHANGE AND PULMONARY CIRCULATION IN CHRONIC DIFFUSE LIVER LESIONS. (Rus.) Kireev, P. M.; Martynov, I. F.; Batal, A. O. (Dept. Internal Diseases, Patris Lumumba Univ., Moscow, USSR). *Klin. Med. (Mosk.)* (12):95-101; 1977.

The state of pulmonary ventilation, gas exchange, and pulmonary circulation was studied in a group of 87 patients with various forms of chronic hepatitis or cirrhosis. The patients were divided into five groups: group 1 consisted of 10 patients with chronic persistent hepatitis, group 2 of 13 patients with chronic active hepatitis, group 3 of 10 patients with portal cirrhosis, and group 5 of 27 patients with postnecrotic cirrhosis. All patients had decreased lung vital capacity (3,050 ml, 2,774 ml, 2,668 ml, 2,267 ml, and 2,440 ml in groups 1-5, resp., compared with 3,968 ml in healthy controls). Maximal lung ventilation was also decreased in all patients, and comprised 41.2% of the expected value in the patients with postnecrotic cirrhosis and 58.5% of the expected value in the patients with chronic active hepatitis. All patients had marked hyperventilation due to the increased minute respiratory volume (8.9, 10.1, 8.0, 10.0, and 8.7 liters in groups 1-5, resp., compared with 7.1 liters in healthy controls.).

5709 CHRONIC HEPATITIS: A PROBLEM FOR THE PATHOLOGIST. (Eng.) Scheuer, P. J. (Royal Free Hosp., Pond St., London NW3 2QG, England). *Histopathology* 1(1):5-19; 1977.

The various forms and histological diagnosis of chronic hepatitis are reviewed. The accepted histological categories of chronic hepatitis are chronic persistent hepatitis (CPH) and chronic active or aggressive hepatitis (CAH). A third form, chronic lobular hepatitis (CLH), encompasses those cases in which the lesion is predominantly within the lobules and in which portal and periportal inflammation are mild. International agreement on a reproducible and rational nomenclature of chronic hepatitis is still far from complete. CPH is characterized by portal inflammation. Histological definition is simple, but there are diagnostic pitfalls. The category may need subdivision on the basis of immunological studies. CAH should be regarded as a complex rather than a single disease, and it is important to specify the etiology and pathological components in each instance. The concept of CAH must be altered to incorporate the lesion of bridging hepatic necrosis (BHN). Piecemeal necrosis, accompanied by inflammatory infiltration, is considered to be the most important of the various pathogenetic factors in CAH, but BHN probably plays a significant part in accelerating the development of cirrhosis. An excessive portal and periportal inflammatory reaction with or without BHN, in a liver biopsy taken during the course of an acute hepatitis, helps to predict a possible chronic course.

5710 CHRONIC HEPATITIS. CURRENT VIEWS ON CLASSIFICATION, PATHOGENESIS, AND TREATMENT. (Rus.) Podymova, S. D. (I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Klin. Med. (Mosk.)* 45(10):117-125; 1977.

Current views on the classification, pathogenesis, and treatment of chronic hepatitis are reviewed. Etiologically, chronic hepatitis can be caused by infectious factors (acute viral hepatitis), toxic and toxico-allergic factors, and alcohol. Recent discovery of the Australia antigen casts a new light on the etiology of chronic hepatitis. Morphologically, chronic hepatitis can be divided into active, persistent, and cholestatic (in 32 patients with diagnosed chronic cholestatic hepatitis, intrahepatic cholestasis was the chief clinical symptom). The results of examination of 200 patients with chronic hepatitis indicate that autoimmune disturbances are characteristic for the active stages of chronic liver lesions: the patients in relapse of chronic active hepatitis featured marked elevation of IgG and IgM levels. Antibodies against the smooth muscles were detected in 54% of the patients with active chronic hepatitis, 38% of the patients with mixed cirrhosis, 25% of the patients with primary biliary cirrhosis, and were not detected in the patients with persistent hepatitis, systemic lupus erythematosus, rheumatoid arthritis, or other collagen diseases. Mitochondrial antibodies (MA) were detected in 85% of the patients with primary biliary cirrhosis and cholestatic hepatitis and in 25% of the patients with chronic active hepatitis; all MA-positive patients with chronic active hepatitis had clinical, biochemical, and histological symptoms of cholestasis. Among the immunodepressants used for the treatment of the patients with immunologic manifestations are glucocorticosteroid hormones and some derivatives of chloroquinolines.

5711 EVALUATION OF THE EFFICACY OF STAGE-BY-STAGE TREATMENT OF PATIENTS WITH CHRONIC HEPATITIS. (Rus.) Serediuk, N. N.; Neiko, E. M.; Gerasimchuk, A. S.; Foraia, A. I. (Medical Inst., Ivano-Frankovsk, USSR). *Klin. Med. (Mosk.)* 56(2): 47-49; 1978.

The efficacy of various treatment regimens was studied in 54 patients with various forms of chronic hepatitis. Twenty-three patients underwent ambula-

tory treatment alone, 19 patients underwent hospital and then ambulatory treatment, and 14 patients underwent hospital, ambulatory, health resort, and then ambulatory treatment again. The duration of remission in the patients with chronic active hepatitis who underwent ambulatory and hospital-ambulatory treatment was 7.5 months and 10.5 months, resp., compared with 13.5 months in the patients who underwent prolonged, stage-by-stage treatment; efficacy of the stage-by-stage treatment was even greater in the patients with chronic persistent hepatitis (duration of remission in these patients was 2.2 times greater than in the patients who underwent ambulatory treatment alone).

5712 OUTCOME OF CHRONIC ACTIVE HEPATITIS: INFLUENCE OF HISTOCOMPATIBILITY ANTIGENS AND TRIGGERING FACTORS. (Eng.) Lindberg, J.; Lindholm, A.; Iwarson, S. (East Hosp., S-416 85 Goteborg, Sweden). *J. Infect. Dis.* 137(2):189-193; 1978.

The clinical course and outcome of chronic active hepatitis were studied in 25 patients with chronic active hepatitis triggered by external factors (viruses or drugs) and 20 patients with cryptogenic chronic active hepatitis, all of whom were followed for 2 to 5 yr. The first group showed a higher frequency of clinical and biochemical resolution at the end of the observation period than did the second group. The group with cryptogenic disease had a significantly increased frequency of the histocompatibility locus antigen HLA-B8 (75%) in comparison with that in patients with viral or drug-induced hepatitis (40%, $p<0.05$) and had a very large number of women (90%). The group with virus- or drug-induced hepatitis did not differ from normal controls in regard to the distribution of HLA antigens. HLA-B8 and HLA-B12 were found in all but two patients in the group with cryptogenic hepatitis: this group of patients had elevated levels of γ-globulin ($\geq$2.5 mg/100 ml) and autoantibodies in their sera more frequently (80% and 72.7%) than did the group with virus or drug-induced diseases (40% and 10.5% had elevated γ-globulin and autoantibodies, resp.; $p<0.05$ and $p<0.01$, resp.). The results suggest that there are at least two types of chronic active hepatitis: one genetically determined, with signs of enhanced immunoreactivity and with a low degree of healing in 5 yr, and another type triggered by external factors and without predisposing genetic factors. The data suggest that the clinical outcome is more favorable for patients with the second type of chronic active hepatitis.

5713 THE SPECTRUM OF FREE AMINO ACIDS IN SERUM AND AMINO ACID COMPOSITION OF SERUM PROTEINS IN PATIENTS WITH CHRONIC HEPATITIS AND CIRRHOSIS. (Rus.) Manto, I. E.; Manto, E. I. (Dept. Pathologic Physiology, State Univ., Uzhgorod, USSR). *Vrach. Delo* (9):93-95; 1977.

To evaluate the diagnostic significance of disturbances of amino acid metabolism in chronic liver lesions, the spectra of serum free amino acids and serum protein amino acids were studied in 73 patients with chronic hepatitis and 52 patients with cirrhosis. The amino acid spectra were assayed by paper chromatography. The quantitative changes in free amino acid content were more pronounced in the patients with cirrhosis. Compared with the healthy controls, the patients with cirrhosis had decreased content of total serum protein and decreased content of lysine, arginine, aspartic acid, and glutamic acid. The patients with chronic hepatitis had increased content of lysine, histidine, serine, glycine, glutamic acid, threonine, alanine, phenylalanine, and leucine.

5714 LYMPHOCYTE CYTOTOXICITY AGAINST CHANG LIVER CELLS IN CHRONIC ACTIVE HEPATITIS. (Eng.) Kakumu, S.; Hara, T.; Goji, H.; Sakamoto, N. (Nagoya Univ. Sch. Medicine, Nagoya, Japan). *Cell. Immunol.* 36(1):46-53; 1978.

The cytotoxic effect of peripheral blood lymphocytes from 18 patients with chronic active hepatitis (CAH) on Chang liver cells was studied using a ^{51}Cr release assay. Cytotoxic effector cell activity was unaffected or slightly enhanced after the removal of glass-adherent mononuclear cells, indicating that the major effector cell is not a classical monocyte. Lymphocytes from 12 of the 18 patients with CAH were cytotoxic, and the cytotoxic cells were contained within thymus-derived cell (T-cell)-depleted fractions. Further studies revealed that these effector cells were killer (K) cells, not bone marrow-derived (B) cells. K cells were identified as constant fragment (Fc)- and complement receptor-bearing cells without detectable surface immunoglobulin. Serial studies in CAH showed continuous cytotoxicity in contrast to transient cytotoxicity in acute viral hepatitis, suggesting that the cytotoxic activity of lymphocytes is responsible for persistence of the disease.

5715 T AND B LYMPHOCYTES IN PATIENTS WITH CHRONIC ACTIVE HEPATITIS (CAH). (Eng.) Colombo, M.; Vernace, S. J.; Paronetto, F. (Istituto di Clinica Medica Generale e Terapia Medica III, Univ. Milan, Milan, Italy). *Clin. Exp. Immunol.* 30(1):4-9; 1977.

To investigate the immune pathogenesis of chronic active hepatitis, absolute number of thymus-derived (T) and bone marrow-derived (B) lymphocytes as well as active E rosette-forming cells were measured in 27 patients with CAH, and in 30 controls. In patients with CAH without cirrhosis, active E rosette-forming cells (a subpopulation of T lymphocytes considered to be actively involved in cell-mediated immune reactions) as well as lymphocytes with surface markers for IgA, IgM, and IgG were increased. In patients with CAH and cirrhosis, total T lymphocytes were decreased. These results emphasize the significance of lymphocytes in CAH, and suggest the importance of monitoring T- and B-cell populations in patients with this disease.

5716 ALTERATION IN SUPPRESSOR CELL ACTIVITY IN CHRONIC ACTIVE HEPATITIS. (Eng.)

Hodgson, H. J. F.; Wands, J. R.; Isselbacher, K. J. (Royal Postgraduate Medical Sch., London W12, England). *Proc. Natl. Acad. Sci. U.S.A.* 75(3):1549-1553; 1978.

Peripheral blood mononuclear cells obtained from 24 patients with acute or chronic active hepatitis were studied to determine if there is an abnormality in concanavalin A-induced suppressor cell activity compared with control subjects. Suppressor cells were generated by preincubation of the mononuclear cells with a mitogenic concentration of concanavalin A (6 μg/ml) for 48 hr followed by treatment with mitomycin C (50 μg/ml) and α-methylmannoside (30 mM). Suppressor cell activity was assessed in second cultures by inhibition of concanavalin A-stimulated blast transformation of fresh allogeneic lymphocytes. Concanavalin A-stimulated suppressor activity was not elicited in mononuclear cells from the majority of patients with chronic active hepatitis in contrast to patients with acute hepatitis or acute inflammatory diseases and controls ($p<0.001$). This finding was demonstrable in chronic active hepatitis patients in remission and relapse, both on and off prednisone therapy, and varied considerably during the course of the disease. The extent of liver injury was not related to the measured suppressor cell activity. These studies suggest that in chronic active hepatitis, a disease in which the host immune response may be involved, there is a defect in concanavalin A-stimulated suppressor cells.

5717 PERSISTENT HBs-ANTIGENEMIA AND CHRONIC HEPATITIS. (Rus.) Bliuger, A. F.; Krupnikova, E. Z.; Veksler, Kh. M.; Kartashova, O. Ia.; Smirnova, N. V.; Nizgol'd, E. V. (No affiliation given). *Vestn. Akad. Med. Nauk SSSR* (9):45-53; 1977.

The results of comparative immunologic analyses of various forms of persistent antigenemia involving hepatitis B surface antigen (HBsAg) in 17 patients with chronic persistent hepatitis (CPH), 13 with chronic active hepatitis (CAH), and 8 "healthy" HBsAg-carriers are presented. HBsAg was detected in 10/17 patients with CPH and 6/13 patients with CAH. One-third of the patients with HBsAg-positive CPH showed inhibition of T-lymphocytes and sensitization of immunocytes to HBsAg. All patients with HBsAg-positive CAH showed inhibition of functional activity of T lymphocytes, two-thirds of the patients had decreased number of T lymphocytes, and one-half had decreased number of B lymphocytes. There were no regular immunologic changes in the "healthy" HBsAg carriers.

5718 AUSTRALIA ANTIGEN IN PERSISTENT HEPATITIS IN NORTHERN INDIA. (Eng.) Sakhrie, H. V.; Shrivastava, P. N.; Chuttani, H. K.; Saha, K. (Maulana Azad Medical Coll., New Delhi, India). *J. Indian Med. Assoc.* 69(8):170-173; 1977.

5719 HLA ANTIGENS IN HB_S ANTIGEN POSITIVE CHRONIC ACTIVE HEPATITIS. (Eng.) Penner, E.; Grabner, G.; Dittrich, H.; Mayr, W. R. (Ordinariat fur Gastroenterologie, Univ. Vienna, Vienna, Austria). *Tissue Antigens* 10(1):63-64; 1977.

See also, 5333, 5335, 5337, 5645, 5647, 5686, 5693, 5696, 5697, 5698, 5699, 5706.

LIVER AND BILIARY TRACT

Alcoholic Liver Disease

5720 SERUM α_1-ANTITRYPSIN LEVELS IN ALCOHOLIC HEPATITIS. (Eng.) Mihas, A. A. (Div. Gastroenterology, Univ. Alabama in Birmingham, University Station, Birmingham, AL 35294). *Digestion* 17(3):275-277; 1978.

Serum α_1-antitrypsin concentrations were measured in 68 patients with liver disease, 10 of whom had pancreatitis associated with alcoholic hepatitis. High mean values (359 ± 18.0 ng/dl, $p<0.01$ in comparison with controls) were found in the 30 patients with alcoholic hepatitis without pancreatitis, whereas the 10 patients with acute viral hepatitis and the 18 with chronic active hepatitis did not show any significant differences from the 20 controls (292 ± 13.7 ng/dl). In the patients with

both alcoholic hepatitis and acute pancreatitis, the mean value (218 ± 5.8 ng/dl) was significantly lower ($p<0.001$) than in the controls. The mechanism for the reduction of serum α_1-antitrypsin levels in this group remains to be clarified, but low serum α_1-antitrypsin may be due to increased proteolytic enzyme concentrations in acute pancreatitis.

5721 LIVER SCINTIGRAPHY IN ALCOHOLIC LIVER DISEASE. (Eng.) Prakash, V.; Lin, M. S.; Kriss, J. P. (Veterans Admin. Hosp., Palo Alto, CA 94304). *Clin. Nucl. Med.* 2(9):308-309; 1977.

5722 UNUSUAL PRESENTATION OF LAENNEC'S CIRRHOSIS WITH HAEMOPTYSIS. (Eng.) Banerji, D. (Burnpur Hosp., Asansol, India). *J. Indian Med. Assoc.* 68(1):14-15; 1977.

See also, 5333, 5335, 5657.

LIVER AND BILIARY TRACT

Cirrhosis

5723 PRIMARY BILIARY CIRRHOSIS. (Eng.) Sherlock, S. (No affiliation given). *Mt. Sinai J. Med.* 44(6):790-797; 1977.

Immunological changes, early diagnosis, and therapy of primary biliary cirrhosis (PBC) are reviewed. PBC is a disease where granulomas may be found in the liver and elsewhere. It can be distinguished from sarcoidosis by its clinical and biochemical picture and the negative Kveim-Siltzbach test. Cell-mediated immunologic reactions are depressed. The serum mitochondrial antibody test is positive in about 90% of patients and is of diagnostic value. PBC may be diagnosed at a presymptomatic stage by (1) recognition of commonly associated disease, (2) abnormal biochemical tests, particularly increased serum alkaline phosphatase and IgM levels, (3) presence of serum mitochondrial antibodies, and (4) diagnostic or compatible hepatic histology. The prognosis of the presymptomatic state is impossible, but 2 to 10 yr may pass before symptoms develop. The duration of the symptoms is 4 to 7 yr. A controlled prospective trial of azathioprine showed only doubtful benefit for the drug. Liver copper levels are very high in primary biliary cirrhosis and D-penicillamine (900 mg/day) reduces liver copper concentration and serum aspartate transaminase levels. Because of the variable natural history of the disease and the observed longer survival following early diagnosis, many years must elapse before it is known whether cirrhosis, portal hypertension, and liver failure are delayed or prevented by the treatment. Treatment with D-penicillamine, preferably within controlled trials, is recommended despite the associated toxicity.

5724 MECHANISM FOR REDUCED DRUG CLEARANCE IN PATIENTS WITH CIRRHOSIS. (Eng.) Pessayre, D.; Lebrec, D.; Descatoire, V.; Peignoux, M.; Benhamou, J. P. (Hopital Beaujon, 92118 Clichy Cedex, France). *Gastroenterology* 74(3):566-571; 1978.

The mechanism responsible for reduced clearance of highly extractable *d*-propranolol (i.e., in normal subjects) in patients with cirrhosis was investigated in 14 patients with alcoholic cirrhosis, 6 alcoholics with fibrosis but no cirrhosis, and 6 normal controls. After the i.v. injection of *d*-propranolol (0.4 mg/kg), the total clearance of the drug was not different in the subjects with normal liver (21 ± 7 ml/min/kg) from that in the patients with alcoholic fibrosis (18 ± 8 ml/min/kg); the total clearance of the drug was significantly lower in the patients with alcoholic cirrhosis (8 ± 5 ml/min/kg, $p<0.05$). Concomitantly with the pharmacokinetic study, a hepatic vein was catheterized, and indocyanine green was infused in all patients with fibrosis of the liver and in 6 of the 14 patients with cirrhosis. Information provided by these techniques allowed measurement of the hepatic clearance of *d*-propranolol and estimation of its contributing factors: the hepatic clearance of *d*-propranolol was 18 ± 6 ml/min/kg in patients with fibrosis and only 6 ± 3 ml/min/kg in patients with cirrhosis ($p<0.05$); the liver blood flow was 25 ± 9 ml/min/kg in the former and 14 ± 6 ml/min/kg in the latter patients ($p<0.05$); the hepatic extraction ratio of *d*-propranolol was 0.73 ± 0.09 in patients with fibrosis of the liver and 0.41 ± 0.17 in patients with cirrhosis ($p<0.05$); and the intrinsic hepatic clearance of *d*-propranolol, a mathematical concept expressing the maximal ability of the liver to remove the drug from the blood, was 72 ± 30 ml/min/kg in the former and only 12 ± 7 ml/min/kg in the latter patients ($p<0.05$). It is concluded that in patients with cirrhosis (1) the total clearance of *d*-propranolol is reduced, (2) the reduced total clearance is a consequence of a reduced hepatic clearance, and (3) the reduced hepatic clearance results mainly from an impaired ability of

the liver to remove the drug from the blood and secondarily from a reduced liver blood flow.

5725 REDUCTION IN PERIPHERAL BLOOD K CELLS AND ACTIVATED T CELLS IN PRIMARY BILIARY CIRRHOSIS. (Eng.) Sandilands, G. P.; MacSween, R. N. M.; Gray, K. G.; Holden, R. J.; Mills, P.; Reid, F. M.; *et al.* (Western Infirmary, Glasgow G11 6NT, Scotland). *Gut* 18(12):L1017-L1020; 1977.

Lymphocyte subpopulations were measured in the peripheral blood of 13 patients with primary biliary cirrhosis (PBC), 13 with chronic active hepatitis (CAH), and 16 age- and sex-matched normal subjects, since sequestration of a particular subpopulation in the liver might be reflected by a diminution of this population in the circulation. A significant (relative and absolute) reduction in activated thymus-derived (T) and killer (k) cells, compared with that in normal subjects, was found in PBC ($p=0.01$ for T cells, $p=0.002$ for K cells) but not in CAH. The reduction in K cells observed in PBC was accompanied by a parallel decrease in lymphocyte-mediated antibody-dependent cytotoxicity. The results support the hypothesis that T and K cells may be sequestered in the liver. A further possibility is that the decrease in K cells may be partly caused by the binding of immune complexes to the Fc (antibody constant fragment) receptors of these cells.

5726 HEMATOLOGICAL CHANGES FOLLOWING SPLENECTOMY IN LIVER CIRRHOSIS. (Rus.) Galeev, M. A.; Farkhutdinov, R. G.; Gaisina, V. T.; Ibragimov, R. M.; Safin, I. A. (Dept. General Surgery, Bashkir Medical Inst., Ufa, USSR). *Klin. Med. (Mosk.)* 55(11):85-89; 1977.

The functional activity of the megakaryocytic-platelet system was studied in 127 patients with cirrhosis, including 60 patients with postnecrotic cirrhosis, 39 with portal cirrhosis, 16 with mixed cirrhosis, and 12 with biliary cirrhosis. Seventy-nine patients had enlargement of the spleen. The patients with hypersplenism had a significantly decreased number of active megakaryocytes (15.4 ± 0.7 compared to 30.3 ± 1.8% in the patients without hypersplenism, $p<0.01$), thrombocytopenia (to 93.3 ± 9.9 cells/mm^3 compared to 207.3 ± 21.2 cells/ml in the patients without hypersplenism, $p<0.001$), and more pronounced inhibition of adhesive activity of the platelets (14.3 ± 3.9% compared to 27.0 ± 4.2% in the patients without hypersplenism, $p<0.001$). Sixty-eight patients underwent conservative treatment and 59 underwent surgery. Surgically treated patients could be divided into two groups: group 1 consisted of 34 patients who underwent splenectomy with organoanastomoses, and group 2 included 25 patients who underwent splenectomy with organoanastomoses, marginal resection of the liver, and cannulation of the portal vein with subsequent prolonged infusion of therapeutic agents. The best results were achieved in group 2: the number of active megakaryocytes increased to 44.0 ± 2.7% ($p<0.001$), adhesive activity of the platelets increased to 39.7 ± 4.1% ($p<0.001$), and the total number of platelets increased to 271.7 ± 15.5 cells/mm^3 ($p<0.001$).

5727 SOURCES OF SERUM [^{14}C]-OCTANOATE IN CIRRHOSIS OF THE LIVER AND HEPATIC ENCEPHALOPATHY. (Eng.) Rabinowitz, J. L.; Staeffen, J.; Blanquet, P.; Vincent, J. D.; Terme, R.; Series, C.; *et al.* (Veterans Admin. Hosp., Philadelphia, PA 19104). *J. Lab. Clin. Med.* 91(2):223-227; 1978.

Studies were carried out in 25 patients with alcoholic cirrhosis and hepatic encephalopathy to determine the origin of high levels of serum octanoate. Assays for octanoate were modified to permit isolation of pure octanoate after gas-liquid chromatography. The patients with these conditions received differently labeled ^{14}C-palmitates i.v.; serum ^{14}C-octanoate was isolated in each case and shown by mass spectrometry to be authentic octanoate. 1-^{14}C-oleate and 1-^{14}C-stearate were also shown to serve as precursors of serum ^{14}C-octanoate. When differently labeled palmitates (1-^{14}C, omega-^{14}C, and ^{14}C-uniformly labeled) were used, different yields of serum ^{14}C-octanoate were recovered. Octanoate samples were chemically degraded to yield individual carbons or groups of carbons. In this manner, it was possible to determine the percentage distribution of the ^{14}C-label within the octanoate carbon chain. It was found that 60% to 80% of the serum octanoate was obtained from the incomplete beta-oxidation of long-chain fatty acids, and that 20% to 40% of the octanoate may have been formed *de novo*.

5728 HEPATOFUGAL PORTAL BLOOD FLOW IN HEPATIC CIRRHOSIS. (Eng.) Foster, D. N.; Herlinger, H.; Miloszewski, K. J. A.; Losowsky, M. S. (St. James' Univ. Hosp., Leeds, England). *Ann. Surg.* 187(2):179-182; 1978.

Three patients with histologically confirmed cirrhosis in whom hepatofugal portal blood flow was unequivocally demonstrated by arteriography are reported. In these patients, no surgical portasystemic shunt had been performed, and there was no evidence of the Budd-Chiari syndrome or hepatoma, conditions associated with reversed portal blood flow. Theoretical considerations suggest that shunt surgery for bleeding esophageal varices should not be ruled out on the grounds of hepatofugal portal flow. However, end-to-side portacaval anastomosis and distal splenorenal shunt might predispose to the early redevelopment of esophageal varices when reversed portal flow is present. Side-to-side portacaval and conventional splenorenal shunts might be preferable in having less effect on hepatic parenchymal perfusion than when orthograde portal flow is the case.

5729 PLASMOSORPTION AND PLASMAPHERESIS WITH PLASMA EXCHANGE BY A CONTINUOUS SEPARATION APPARATUS IN THE TREATMENT OF HEPATIC INSUFFICIENCY. (Rus.) Lopukhin, Iu. M.; Molodenkov, M. N.; Shurkalin, B. K.; Evseev, N. G. (N. I. Piro-

gov Second Medical Inst., Moscow, USSR). *Anesth. Reanim.* (2):57-61; 1977.

The results of the first clinical trial of artificial hemabsorption for the treatment of hepatic insufficiency are presented. To avoid the destruction of formed blood elements, which might lead to severe complications in the patient and to "thrombosis" of the column, blood plasma was separated by a continuous separation apparatus, the "Celltrifuge" (Aminco). Plasmapheresis with plasma exchange was performed in five patients with acute hepatic insufficiency (4 patients had obstructive jaundice and cholangitis, and 1 patient had CCl_4 intoxication); plasmapheresis with plasmasorption was performed in four patients with acute hepatic insufficiency due to intoxication with CCl_4, dicholoroethane, and trichloroethylene. The procedure reduced the symptoms of intoxication (disappearance of encephalopathy manifestations and skin itch), decreased the blood bilirubin level (by 2-3 mg%), and induced a slight thrombocytopenia.

5730 ISOBUTYL 2-CYANOACRYLATE (BUCRYLATE) IN OBLITERATION OF GASTRIC CORONARY VEIN AND ESOPHAGEAL VARICES. (Eng.) Lunderquist, A.; Borjesson, B.; Owman, T.; Bengmark, S. (Univ. Hosp., S-221 85 Lund, Sweden). *Am. J. Roentgenol.* 130(1): 1-6; 1977.

Clinical experience with injecting isobutyl 2-cyanoacrylate (bucrylate) into the short gastric and coronary veins for the treatment of portal hypertension and bleeding esophageal varices in 22 patients is reviewed. Percutaneous transhepatic portography was performed in all patients. One or more veins feeding esophageal varices were occluded with bucrylate. Follow-up examination in eight patients 1-12 months later showed recanalization of previously obliterated veins in six; however, these veins were markedly smaller than before the procedure. In patients where veins were still occluded, new veins had opened up and carried blood to the esophageal varices, which were filled to a lesser degree than before. In the authors' experience, bucrylate is superior to Gelfoam, thrombin, and Etolein in producing venous occlusion.

5731 RANDOMIZED TRIAL OF EMERGENCY MESOCAVAL AND PORTACAVAL SHUNTS FOR BLEEDING ESOPHAGEAL VARICES. (Eng.) Malt, R. A.; Abbott, W. M.; Warshaw, A. L.; Vander Salm, T. J.; Smead, W. L. (Massachusetts General Hosp., Boston, MA 02114). *Am. J. Surg.* 135(4):584-588; 1978.

To compare the efficacy of mesocaval and portacaval shunts for bleeding esophageal varices, a randomized trial of emergency portacaval or mesocaval shunting was conducted in 24 cirrhotic patients bleeding from esophageal varices. The 11 patients who had mesocaval shunts were comparable to the group who had portacaval shunts in age distribution, sex, and preoperative physical condition. Postoperative fatality rates were 46% after portacaval shunting and 73% after mesocaval shunting. These results favor portacaval shunts for the emergency control of bleeding varices in the spectrum of patients seen in an urban hospital.

5732 PORTAL HYPERTENSION IN FIBROCHOLANGIOCYSTOSIS. (Rus.) Cistova, L. V.; Leontiev, A. P.; Markov, B. A.; Osipov, N.; Potapova, I. N.; Dynkova, I. I. (Res. Inst. Pediatrics, Moscow, USSR). *Khirurgiia* (1):52-57; 1978.

A group of 29 children (1 to 14 yr) with congenital fibrocholangiocystosis (FCC) is reviewed. The early clinical manifestations of the syndrome of portal hypertension were hepatosplenomegaly (28), esophageal-gastric hemorrhage (13), and protrusion of the umbilical vein (4); 14 children had combined polycystosis of the liver and kidneys. Splenoportography showed stenosis of the portal vein. Unlike the patients with cirrhosis, children with FCC had a markedly developed by-pass circulation. To prevent esophageal-gastric hemorrhage, 19 children underwent surgery (5 of them underwent repeated surgery). Surgery included splenectomy (13), splenorenal anastomosis (5), cavo-mesenterial anastomosis (2), gastrotomy (2), and external devascularization of the stomach (2). Two children died immediately after surgery (of renal and hepatic insufficiency), three children died within 14 yr of surgery (2 of esophageal-gastric hemorrhage and 1 of hepatic insufficiency).

5733 PORTAL HYPERTENSION IN SYSTEMIC MASTOCYTOSIS. (Eng.) Capron, J. P.; Lebrec, D.; Degott, C.; Chivrac, D.; Coevoet, B.; Delobel, J. (Centre Hospitalier Universitaire, Place Victor Pauchet, 80030 Amiens Cedex, France). *Gastroenterology* 74(3):595-597; 1978.

The case of a 66-yr-old man with portal hypertension related to systemic mastocytosis is reported. The liver was enlarged, and light microscopy showed portal mast cell infiltration and fibrosis. Portal hypertension was evidenced by splenomegaly, esophageal varices, and an increased wedged-free hepatic venous pressure gradient. Arteriography showed that the portal vein was patent. Portal hypertension could be the consequence of intrahepatic block due to mast cell infiltration and/or fibrosis of the liver.

5734 TRANSVASCULAR ESCAPE RATE OF ALBUMIN IN LIVER CIRRHOSIS, AND ITS POSSIBLE ROLE IN FORMATION OF ASCITES. (Eng.) Henriksen, J. H.; Winkler, K. (Hvidovre Hosp., Kettegaard Alle 30, DK-2650 Hvidovre, Denmark). *Scand. J. Gastroenterol.* 12(7):877-884; 1977.

The transvascular escape rate of albumin (TER_a) was measured with ^{131}I-labeled human serum albumin (^{131}I-RISA) during hepatic vein catheterization in 10 men with alcoholic liver cirrhosis. Portal hypertension (mean wedged hepatic vein pressure 26 ± 6.6 mm Hg), and low serum albumin concentration (mean 425 ± 90 μM) were present. Diuretic treatment was given to nine subjects. TER_a (mean 11.4 ± 3.1%/hr) was substantially increased ($p<0.001$).

compared to that reported in normals. A positive correlation between the postsinusoidal resistance and TER_a ($r=0.91$, $p<0.02$) indicated an elevated splanchnic albumin escape rather than increased systemic transvascular escape. No significant correlation was demonstrated between TER_a and wedged hepatic vein pressure. A negative correlation was demonstrated between TER_a and the intravascular mass of albumin ($r=-0.69$, $p<0.05$). The total lymph flow, assuming steady state, was estimated as total albumin plasma clearance (plasma volume x TER_a) and was found to be high (mean 10.2 ± 2.9 1/24 hr). Subjects with tense ascites had a lower TER_a ($p<0.02$) and total albumin plasma clearance than subjects without ascites. This finding may indicate that total lymph flow is smaller in patients with tense ascites, perhaps because of impeded lymphatic return.

5735 PRIMARY BILIARY CIRRHOSIS AND COELIAC DISEASE: AN ASSOCIATION? (Eng.) Logan, R. F. A.; Ferguson, A.; Finlayson, N. D. C.; Weir, D. G. (Western General Hosp., Edinburgh, Scotland). *Lancet* 1(8058):230-233; 1978.

Four patients in whom primary biliary cirrhosis was associated with celiac disease are described. In each case, the two conditions were diagnosed simultaneously, and although symptoms were due to celiac disease, initial investigation drew attention to the liver condition. All the patients responded to a gluten-free diet and remain well 2 yr later. Primary biliary cirrhosis remains asymptomatic in three patients, but pruritus has developed in the fourth. The significance of this association is unclear and may merit formal study. Celiac disease should be considered as a possible cause of unexplained weight loss in primary biliary cirrhosis.

5736 PARENTERAL 1,25-DIHYDROXYCHOLECALCIFEROL IN HEPATIC OSTEOMALACIA. (Eng.) Long, R. G.; Varghese, Z.; Meinhard, E. A.; Skinner, R. K.; Wills, M. R.; Sherlock, S. (Hammersmith Hosp., London W12 OHS, England). *Br. Med. J.* 1(6105):75-77; 1978.

The effect of regular i.m. injections of 1,25-dihydroxycholecalciferol ($1,25-[OH]_2D_3$) in four patients with biliary cirrhosis complicated by osteomalacia was tested. Despite regular, long-term, parenteral vitamin D_2 treatment, these patients had multiple symptoms of bone disease, and bone biopsy specimens showed osteomalacia without osteoporosis. Three patients also had a proximal myopathy. Plasma calcium values (after correction for albumin), phosphorus, magnesium, and serum 25-hydroxy-vitamin D were within normal limits. $1,25-(OH)_2D_3$ treatment (15 µg every 4 weeks) relieved symptoms in three of the four patients and improved those in the fourth. Histological examination of bone showed improvement in all four patients, but serum and urinary biochemical changes were not pronounced. It is concluded that $1,25-(OH)_2D_3$ treatment has a beneficial effect on bone and muscle in hepatic osteomalacia, either because vitamin D 1-hydroxylation fails in biliary cirrhosis or because hepatic osteomalacia is resistant to vitamin D_2 metabolites.

5737 ZINC DEFICIENCY: A CAUSE OF ABNORMAL DARK ADAPTATION IN CIRRHOTICS. (Eng.) Morrison, S. A.; Russell, R. M.; Carney, E. A.; Oaks, E. V. (Univ. Maryland Sch. Medicine, Baltimore, MD). *Am. J. Clin. Nutr.* 31(2):276-281; 1978.

The role of zinc deficiency in the pathogenesis of abnormal dark adaptation was studied in six male cirrhotics with low serum zinc levels (<70 µg/100 ml) and abnormal dark adaptation responses (mean dark adapted final threshold 3.2 ± 0.6 versus 2.1 ± 0.2 log lux in 21 age-matched controls, $p<0.01$). Serum vitamin A concentration ranged from 15 to 37 µg/100 ml. Three patients received zinc sulfate (220 mg/day) for 1 to 2 weeks, and dark adapted final thresholds fell 0.9, 0.4, and 1.2 log lux in each patient, resp., without concurrent rises in serum vitamin A levels. Two other patients were treated initially with p.o. vitamin A (10,000 IU/day) for 2 to 4 weeks, but their final thresholds fell to normal (2.1, 2.2 log lux, resp.) only after the addition of zinc for 1 to 2 weeks. The sixth patient, treated with vitamin A and zinc together, attained a normal final threshold in 2 weeks. The improvement in dark adaptation by zinc may be due to enhanced activity of previously depressed retinol dehydrogenase.

5738 GLUCAGON METABOLISM IN CIRRHOSIS OF THE LIVER [Abstract]. (Eng.) Dudley, F. J.; Alford, F. P.; Chisholm, D. J. (Dept. Medicine, Monash Univ., Melbourne, Australia). *Gastroenterology* 72(5, Part 2):1052; 1977.

5739 INTRACTABLE ASCITES: TREATMENT WITH LEVEEN PERITONEO-VENOUS SHUNT [Abstract]. (Eng.) Bethel, R. A.; Ansley, J. D.; Bowen, P. A., II (Dept. Medicine, Emory Univ., Atlanta, GA). *Clin. Res.* 25(3):307A; 1977.

5740 DIURESIS OF ASCITES: FRAUGHT WITH OR FREE FROM HAZARD. (Eng.) Conn, H. O. (Veterans Admin. Hosp., West Haven, CT). *Gastroenterology* 73(3):619-621; 1977.

5741 HEMODYNAMICS OF HEPATIC DISEASE FOLLOWING MUSTARD'S PROCEDURE. (Eng./Fre.) Chaumont, P.; Kalifa, G.; Harry, G. (Hopital Parrot, 78 r. du General Leclerc, F94270 Le Kremlin-Bicetre, France). *Ann. Radiol.* 20(1):63-69; 1977.

5742 FAMILIAL HEMOCHROMATOSIS: PHYSIOLOGIC STUDIES IN THE PRE-CIRRHOTIC STAGE OF THE DISEASE [Abstract]. (Eng.) Feller, E. R.; Pont, A.; Wands, J. R.; Carter, E. A.; Foster, G.; Isselbacher, K. J. (Massachusetts General Hospital, Boston, MA). *Gastroenterology* 72(5, Part 2):1158; 1977.

See also, 5335, 5337, 5647, 5648, 5651, 5669, 5699, 5707, 5708, 5713, 5775.

LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

5743 RADIOMANOMETRIC GUIDES TO COMMON BILE DUCT EXPLORATION. (Eng.) McCarthy, J. D. (Lovelace-Bataan Medical Center, Albuquerque, NM 87108). *Am. J. Surg.* 134(6):697-701; 1977.

The usefulness of radiomanometry in increasing the accuracy of operative cholangiograms was evaluated based on results with 198 patients seen during 1967-1976, who could be grouped as having previous or existing jaundice, displaying an elevated passage pressure as a solitary abnormality, or having an isolated elevation of serum alkaline phosphatase level. Even under what would appear to be optimal conditions for roentgenographic diagnosis of cholelithiasis, many small choledocholiths were missed (17/198). Radiomanometry was performed on 29/44 patients with jaundice; there were 23 correct positive assessments of calculi, 2 false positives, and 4 false negatives. Of these 29 patients, 14 had elevated passage pressure in addition to correctly positive x-ray studies, and 3 had elevated passage pressure with false negative x-ray studies. The utility of radiomanometry was best illustrated in a group of 14 patients in whom elevated passage pressure was the only abnormality: 9 of these patients were found to have choledocholithiasis, all yielding small stones, and 3 others displayed good evidence for stenosing papillitis. This group of 14 patients would not have been identified by routine cholangiography. An isolated elevation of serum alkaline phosphatase level was found in 11 patients, 9 of whom proved to have choledocholithiasis. Passage pressures were normal in two patients with calculi and in the two patients without calculi. Cholangiographic x-ray diagnosis led to frequent errors (16% false-positives). Manometry alone is not recommended because it cannot establish that flow has traversed the sphincter of Oddi. However, if the cholangiogram was positive for calculi and the passage pressure elevated, stones were almost invariably found (95% success rate). Additionally, radiomanometry is the only method for diagnosing stenosing papillitis.

5744 LONG TERM RESULTS OF ROUX-EN-Y HEPATICOJEJUNOSTOMY. (Eng.) Bismuth, H.; Franco, D.; Corlette, M. B.; Hepp, J. (Hopital Paul Brousse, Villejuif, France). *Surg. Gynecol. Obstet.* 146(2): 161-167; 1978.

The long-term results of Roux-en-Y hepaticojejunostomy were evaluated in 123 patients with benign bile duct diseases to ascertain if hepaticojejunostomy is a safe and durable procedure. There were no operative deaths. A peptic ulcer developed postoperatively in two patients. Only one instance of anastomotic stenosis was observed at follow-up study, averaging 5.5 yr. Six of the 11 patients with postoperative biliary symptoms had intrahepatic lithiasis, a possible indication that the symptoms were due to temporary obstruction of the anastomosis by residual stones. A refined operative technique has improved the results which over-all are highly satisfactory. The authors conclude that this is the best type of biliary anastomosis in hepatic transplantation.

5745 INCIDENTAL CHOLECYSTECTOMY DURING MAJOR ABDOMINAL SURGERY IN THE ELDERLY. (Eng.) Schreiber, H.; Macon, W. L.; Pories, W. J. (Cleveland Metropolitan General Hosp., 3395 Scranton Rd., Cleveland, OH 44109). *Am. J. Surg.* 135(2):196-198; 1978.

To investigate incidental cholecystectomy in the elderly, the morbidity and mortality of cholecystectomy, performed during unrelated major abdominal operations, were investigated in 44 patients (average age 78 yr) who were found to have cholelithiasis during surgery. Thirty-nine of them underwent incidental cholecystectomy, one had cholecystostomy, and four had no surgical treatment of their gallbladder disease. Of the 39 patients with an incidental cholecystectomy, none died and only 16 had nonfatal complications. Of these complications, only one was clearly related to the cholecystectomy and resolved spontaneously. The results compare favorably with other reports of similar procedures in elderly patients. Incidental cholecystectomy does not seem to significantly alter the mortality and morbidity of elderly patients undergoing major abdominal surgery. Incidental cholecystectomy is advocated for cholelithiasis in elderly patients as long as the gallbladder is easily accessible and the condition of the patient warrants the additional procedure.

5746 PERCUTANEOUS TRANSHEPATIC DRAINAGE OF THE BILIARY TRACT: TECHNIQUE AND RESULTS IN 104 CASES. (Eng.) Nakayama, T.; Ikeda, A.; Okuda,

K. (Kurume Univ. Sch. Medicine, Kurume, Japan). *Gastroenterology* 74(3):554-559; 1978.

A new two-step procedure for percutaneous transhepatic drainage (PTD) of the biliary tract is described. This technique was applied on a total of 105 cases of obstructive jaundice (84 with malignant and 21 with benign lesions) and was successful in 104. Catheterization is a two-step procedure consisting of the following: (a) puncture of a dilated intrahepatic duct with a steel needle, (b) insertion of a guide wire, (c) removal of the needle, (d) pushing of the catheter over the guide wire, and (e) withdrawal of the guide wire and immobilization of the catheter. This indirect approach using a steel needle first offers the advantage of more easily finding and entering the bile ducts. The decompression effect was adequate and the reduction in serum bilirubin level was quick. Operative mortality, which used to be high in jaundiced patients with serum bilirubin levels above 10 mg/dl, was significantly reduced with this procedure. PTD proved to be very useful in the management of acute obstructive suppurative cholangitis and ensuing liver abscesses. Continuous drainage was also achieved by PTD in inoperable cases, and one patient with a hilar carcinoma was kept alive for 3 yr and 1 month by PTD alone. With the improvement in the diagnosis of biliary tract disease, this procedure will assume an important position in the management of obstructive jaundice.

5747 THE RELATIONSHIP BETWEEN BILIARY TRACT INFECTIONS AND POSTOPERATIVE COMPLICATIONS. (Eng.) Cox, J. L.; Helfrich, L. R.; Pass, H. I.; Osterhaut, S.; Shingleton, W. W. (Duke Univ. Medical Center, Durham, NC). *Surg. Gynecol. Obstet.* 146(2): 233-236; 1978.

The hospital records of 870 consecutive patients undergoing elective biliary tract operations during an 8-yr period are reviewed to determine the incidence of biliary tract infections and positive cultures in chronic biliary tree infections. In addition, the presence of bacteria in the biliary tract was correlated with the development of postoperative wound infections, postoperative cholangitis, and septicemia. Bacteriologic cultures of the biliary tract obtained in 451 patients were correlated with specific biliary tract abnormalities and with postoperative complications. The incidence of positive biliary tract cultures was higher in patients with common duct disease (60%) than in those with chronic gallbladder disease without common duct disease (19%). Choledocholithiasis and partial common bile duct obstruction are viewed as important factors in causing a high incidence of positive biliary tract cultures. Eighty-eight percent of patients who had undergone previous biliary tract decompression procedures had positive cultures. There was no difference in the yield of positive cultures taken from the gallbladder wall and the gallbladder bile. Forty-nine percent of patients with common bile duct disease and positive biliary tract cultures had no history of clinical cholangitis. Postoperative wound infections were more common in patients with common duct disease (8.8%) than those without it (2.8%). *Escherichia coli*, *Aerobacter*, and Enterococci accounted for nearly 80% of all positive cultures from the biliary tract. The incidence of postoperative wound infections in the 607 patients who received antibiotics preoperatively was 5.8%. Among 263 patients who received no antibiotics, wound infections developed in 5. Among 262 patients who underwent common bile duct operations, 252 received antibiotics beginning 12 hr before surgery and continuing for 2 to 7 days postoperatively of whom 17 developed cholangitis. Seven of the ten patients who did not receive antibiotics developed cholangitis. The results demonstrate that antibiotics should be used to cover any surgical procedure involving the biliary tract in patients with common duct disease.

5748 HEPATIC FUNCTION FOLLOWING PORTOENTEROSTOMY FOR EXTRAHEPATIC BILIARY ATRESIA. (Eng.) Sondheimer, J. M.; Shandling, B.; Weber, J. L.; Cutz, E.; Gall, D. G. (State Univ. New York, Upstate Medical Center, 750 E. Adams St., Syracuse, NY 13210). *Can. Med. Assoc. J.* 118(3):255-258; 1978.

Liver structure and function in 10 patients with extrahepatic biliary atresia were studied after portoenteric anastomosis (Kasai operation). Bile flow adequate to reduce the serum bilirubin concentration (minimum, <1.0-4.2 mg/dl) was established in five patients (improved group), three of whom became anicteric. The serum bilirubin concentration did not decrease in the remaining five patients (unimproved group), the minimum levels being 8.7-13.5 mg/dl. Hepatic effluent collected postoperatively from both groups contained small amounts of cholesterol and bilirubin; bile salts, however, were present in the hepatic effluent of only the improved patients. Liver biopsy specimens obtained postoperatively from the five improved patients showed partial (in 2) or complete (in 3) relief of cholestasis; hepatic fibrosis, however, was unchanged (in 1) or worse (in 4). The serum concentrations of bile salts were markedly elevated, despite normal excretion of sodium BSP and rose bengal in two anicteric patients studied 14 and 24 months postoperatively. It is concluded that neither structure nor function of the liver is normalized by portoenterostomy even in clinically well, anicteric patients.

5749 THE USE OF ULTRASOUND IN SUSPECTED CHOLECYSTITIS. (Eng.) Wilson, R. L.; Shaub, M. (Univ. California at Los Angeles Sch. Medicine, Los Angeles, CA). *Appl. Radiol.* 7(1):119-121; 1978.

More than 300 patients with suspected gallbladder disease were examined over a 4-month period in an effort to expand the criteria for a positive diagnosis of the disease. Most patients had previously been examined by at least one radiographic contrast method and had not been successfully visualized. Some patients were examined ultrasonically without benefit of radiographic methods due to allergies or

to emergency situations. The criteria for a positive diagnosis of gallbladder disease included the unequivocal demonstration of gallstones but were expanded to include nonvisualization of the gallbladder, obvious acoustic shadowing that originated in the gallbladder region, thickening of the gallbladder wall, and a contracted gallbladder. The expanded criteria were strongly dependent upon strict adherence to a fat-free diet in cases where the patient was not restricted to i.v. fluids. The scanning technique employed was also a very important factor. False-positive results were in the range of 2%, and false-negative results in the range of 1%. All cases received surgical confirmation.

5750 ON THE PATHOGENESIS OF ACUTE CHOLECYSTITIS. (Eng.) Sjodahl, R.; Tagesson, C.; Wetterfors, J. (Dept. Surgery, Univ. Linkoping, Linkoping, Sweden). *Surg. Gynecol. Obstet.* 146(2):199-202; 1978.

Information concerning the pathogenesis of acute cholecystitis, particularly the role of lysolecithin, is reviewed. At operation for acute cholecystitis, the gallbladder is distended and the passage through the cystic duct is usually blocked by a stone impacted in the neck of the gallbladder. Thus, cholecystitis is a localized inflammatory process, and it should be mediated by local factors. This hypothesis is in agreement with the fact that inflammatory mediators, in general, are released, formed, or activated locally at the site of inflammation. Bacterial growth in the gallbladder bile is probably secondary to an initially aseptic inflammation. Among the chemical agents proposed as mediators of an acute cholecystitis is lysolecithin, known to impair the function of biologic membranes through its surface activity. Lysolecithin causes cell damage and an ensuing inflammatory reaction in the gallbladder. In gallbladder bile from patients operated upon for acute cholecystitis, there is a relative increase in the amount of lysolecithin. The lysolecithin-lecithin ratio is increased. Prerequisites for a local lysolecithin formation in the human gallbladder are at hand since phospholipase A, which transforms lecithin to lysolecithin, is present in the epithelium. Inflammatory mediators also have in common the property of being locally inhibited or inactivated. Accordingly, lysolecithin can undergo different chemical changes; a lysophospholipase activity can split off the fatty acid or an acylating activity can add a fatty acid. Furthermore, the surface activity of lysolecithin can be locally inhibited by lecithin. Under physiologic conditions, these inflammatory-promoting and inflammatory-suppressing activities may balance each other. However, if a stone is impacted into the neck of the gallbladder, the epithelium is damaged. If phospholipase A is released from the epithelium into the lumen of the gallbladder, the anti-inflammatory factors may be overcome. The lysolecithin formed may damage the epithelium further, release more phospholipase A, and maintain a vicious circle. This could induce an accelerating inflammatory reaction in the wall of the gallbladder.

5751 POSTOPERATIVE PERIOD COMPLICATED BY ACUTE CHOLECYSTITIS. (Rus.) Baranchuk, V. N. (Second Dept. Surgery, S. M. Kirov Military Medical Acad., Leningrad, USSR). *Vestn. Khir.* 120(1):66-69; 1978.

Of 28,556 patients subjected to laparotomy, 3 developed acute cholecystitis in the early postoperative period. These patients were 49- and 59-yr-old women and a 68-yr-old man. Two patients underwent initial surgery for phlegmonous appendicitis, and one for catarrhal vermiform process. Two patients had a history of cholelithiasis. The patients developed acute cholecystitis on day 2, 4, or 6 after initial surgery. Two patients underwent cholecystectomy with the drainage of the cystic duct, and one patient underwent cholecystectomy with formation of choledochoduodenostomy.

5752 THE INCIDENCE OF CHOLELITHIASIS IN AN AUTOPSY SERIES. (Eng.) Hogan, J.; Lonergan, M.; Holland, P. D. J. (Royal Infirmary Hosp., Leicester, England). *Ir. Med. J.* 70(20):608-611; 1977.

The presence or absence of gallstones was recorded in relation to age, sex, cause of death, evidence of macroscopic gallbladder disease, associated malignancy, and atherosclerosis in a review of 1,000 autopsies performed in Ireland. In 30 cases, the gallbladder had already been removed. Of the remaining 970 cases, 103 cases with gallstones were recorded. All patients were over 21 yr old, and the frequency of gallstones generally increased with age in both sexes, the peak incidence being in those 80-89 yr. An unexpected finding was the statistically significant correlation between the incidence of gallstones and malignancy; 23.3% of 103 patients with cholelithiasis had malignancy, whereas only 14.4% of the 867 patients without gallstones had malignancy ($p<0.05>0.02$). The types of malignancy were of diverse origins, but an association was considered to exist between carcinoma of the pancreas and the presence of gallstones; one in four of the associated malignancies occurred in the pancreas. Sixty-two of the gallstone cases had associated moderate to severe degrees of atherosclerosis. The frequency of gallstones in this series is lower than that previously reported in Great Britain and Germany.

5753 BACTERIOLOGICAL STUDIES OF COMMON DUCT BILE IN PATIENTS WITH GALLSTONE DISEASE AND JUXTA-PAPILLARY DUODENAL DIVERTICULA. (Eng.) Lotveit, T.; Osnes, M.; Aune, S. (Ulleval Hosp., Oslo 1, Norway). *Scand. J. Gastroenterol.* 13(1): 93-95; 1978.

To analyze the incidence of bacterial colonization in the common duct bile in gallstone diseases and duodenal diverticula, bile samples from the common duct were collected at cholecystectomy from 11 patients with juxta-papillary duodenal diverticula without biliary obstruction and from 27 patients without diverticula and cultivated aerobically and

anaerobically. All patients had chronic cholecystitis and cholelithiasis but no biliary obstruction. A significantly higher incidence of positive cultures was found in patients with diverticula (81.1%) than those without (7.4%, $p<0.01$). The positive samples contained bacterial species belonging to the intestinal flora. The authors propose an ascending route of infection and assume that bacteria may play a role in the formation of gallstones often seen in patients with juxta-papillary duodenal diverticula.

5754 BILIARY LIPID EXCRETION IN PATIENTS WITH PIGMENT GALLSTONES: A COMPARISON WITH CHOLESTEROL GALLSTONE PATIENTS. (Eng.) Wagner, C. I.; Trotman, B. W.; Soloway, R. D. (Hosp. Univ. Pennsylvania, 3600 Spruce St., Philadelphia, PA 19104). *Am. J. Dig. Dis.* 23(1):85-88; 1978.

To measure biliary lipid excretion in pigment gallstone patients and to better understand cholesterol gallstone formation, the kinetics of biliary lipid excretion were studied in three patients who had been cholecystectomized for pigment gallstones and the results compared to those previously obtained in patients cholecystectomized for cholesterol gallstones. Pigment stone patients had hyperbolic relationships between cholesterol and phospholipid outputs and bile salt output that were similar to those seen in cholesterol stone patients. However, pigment stone patients excreted more cholesterol and phospholipid at high bile salt output (0.091 ± 0.008 and 0.548 ± 0.101 μmol/kg/min, resp.) than did cholesterol stone patients (0.052 ± 0.002 and 0.178 ± 0.009 μmol/kg/min, resp., $p<0.001$), but approached those levels more gradually than did cholesterol stone patients ($p<0.001$). As a result, pigment stone patients produced bile undersaturated with cholesterol at a lower bile salt output than did cholesterol stone patients (0.120 versus 0.160 μmol/kg/min), and thus they would be less likely to produce supersaturated bile during low bile salt output, such as that occurring during an overnight fast. The data suggest that cholesterol stone patients, in addition to excreting more cholesterol and less bile salts than do normal individuals, have a defect in the rate of lipid output in response to decreasing bile salt output.

5755 URSODEOXYCHOLIC ACID TREATMENT OF GALLSTONE: DOSE-RESPONSE STUDY AND POSSIBLE MECHANISM OF ACTION. (Eng.) Maton, P. N.; Murphy, G. M.; Dowling, R. H. (Guy's Hosp. and Medical Sch., London SE1 9RT, England). *Lancet* 2(8052/3):1297-1301; 1977.

To determine the optimum dose for the medical treatment of gallstones with ursodeoxycholic acid (UDCA), 11 non-obese patients with radiolucent gallstones received 5, 10, and 15 mg UDCA/kg daily for 6 weeks each. Apart from three patients who required surgery for gallstone complications, treatment was well tolerated, and both dyspeptic symptoms and frequency of biliary colic were reduced. Neither diarrhea nor hypertransaminasemia occurred during therapy. Of three patients completing 6 months' treatment with an average of 8 mg UDCA/kg daily, one showed complete and two partial dissolution of gallstones. There were significant negative correlations between the biliary cholesterol saturation index and the percentage UDCA in biliary bile acids ($r=-0.65$, $p<0.005$) and percentage UDCA plus chenodeoxycholic acid (CDCA) in biliary bile acids ($r=-0.65$, $p<0.005$). Mean γ-glutamyl-transpeptidase activity fell significantly during treatment (by 47%, 38%, and 62% after 6 weeks' treatment with 5, 10, and 15 mg UDCA, $p<0.05$), whereas other liver function tests and hepatic histology remained normal. Mean serum cholesterol levels did not change, and although there was a 13-35% fall in fasting serum triglycerides, this difference was not statistically significant. UDCA, like CDCA, seems to act by inhibiting hepatic cholesterogenesis. In five patients treated with 5 mg UDCA/kg daily for 1 to 6 months, the mean hepatic hydroxymethylglutaryl-coenzyme-A reductase activity was 28% lower than in untreated gallstone patients. These preliminary results suggest that UDCA is as effective as CDCA in one-half to two-thirds the dose and that 10 mg UDCA kg/day should be effective in most gallstone patients.

5756 CHARACTERIZATION OF HIGH DENSITY LIPOPROTEINS IN HUMAN CHOLESTASIS. (Eng.) Arnesjo, B.; Danielsson, B.; Ekman, R.; Johansson, B. G.; Petersson, B. G. (Inst. Biochemistry, Univ. Lund, Lund, Sweden). *Scand. J. Clin. Lab. Invest.* 37(7):587-597; 1977.

The density distribution, electrophoretic mobility, particle size distribution, and protein and lipid composition of plasma high density lipoproteins (HDL) from patients with long-standing cholestasis were studied by several methods including crossed immunoelectrophoresis, gel filtration, and zonal ultracentrifugation. The crossed immunoelectrophoretic pattern against anti-HDL was characterized by the presence of several immunoprecipitates, in contrast to the pattern formed by normal HDL. One of these precipitates corresponded to a lipoprotein species dominated by apoprotein A-II (apo A-II). Zonal ultracentrifugation of cholestatic plasma showed a decrease of HDL and a disappearance of the normal delineation of HDL_2 and HDL_3. In addition, a new component designated HDL_1-C was observed. Consistent results were found in studies of the molecular size distribution of cholestatic HDL by gel filtration on Sephadex G-200. The lipid and apoprotein composition of isolated cholestatic HDL fractions differed considerably from normal. Most notable were the high proportions of phospholipids and free cholesterol and the occurrence of the apoprotein E (arginine-rich protein) in remarkably high amounts especially in the abnormal HDL_1-C. The HDL_1-C readily obtained by zonal centrifugation of plasma from patients with long-standing obstructive jaundice might serve as a suitable material for further studies of the formation and metabolic fate of human HDL.

5757 CHOLEDOCHAL CYST: ETIOLOGICAL CONSIDERATIONS AND SURGICAL MANAGEMENT IN 22 CASES.

(Eng.) Kimura, K.; Tsugawa, C.; Ogawa, K.; Matsumoto, Y.; Yamamoto, T.; Kubo, M.; *et al.* (Kobe Children's Hosp., 1-1-1, Takakuradai, Sumaku, Kobe #654, Japan). *Arch. Surg.* 113(2):159-163; 1978.

Experience with two different surgical approaches to the management of choledochal cyst, excision or choledochocystenterostomy, is presented. In the 14-yr period from 1962 to 1976, there were 22 cases of choledochal cyst. Choledochocystenterostomy to the duodenum was carried out in three cases and to the jejunum in a Roux-en-Y operation in four cases. Excision of the cyst with hepaticojejunostomy was performed in 14 cases, and in the remaining case, cyst excision with end-to-end anastomosis of the common bile duct was carried out. There was one death in the choledochocystenterostomy group and one in the excision group. In five cases, direct cholangiography, either operative or endoscopic, demonstrated a reflux of the contrast material from the biliary system to the pancreatic duct. In four cases, the amylase level of the cystic content was elevated, ranging from 182 to 50,820 Somogyi U. A reflux of the pancreatic juice into the biliary system was thought to be a possible cause of choledochal cyst. Excision of the cyst with hepaticojejunostomy in a Roux-en-Y operation seems to be the treatment of choice from the aspects of cholangitis, malignant change, and termination of the pancreatic reflux to the biliary system.

5758 Tc-99m PYRIDOXYLIDENE GLUTAMATE IN JAUNDICED PATIENTS. (Eng.) Lubin, E.; Rachima, M.; Oren, V.; Weininger, J.; Trumper, J.; Kozenitzky, I.; *et al.* (Beilinson Medical Center, Petah Tiqva, Israel). *J. Nucl. Med.* 19(1):24-27; 1978.

The efficacy of ^{99m}Tc-pyridoxylidene glutamate (PG) in the differential diagnosis of medical from surgical jaundice was tested in 90 patients, 85 of whom were jaundiced. This substance appeared in the gallbladder 10-15 min after its i.v. injection, and in the gastrointestinal tract at 30 min. On the basis of the time of appearance in the intestine, four groups of patients were recognized: (1) 17 patients with a normal pattern, with visualization of the gut at 30 min; (2) 19 patients with a slight delay in passage, with appearance in the gut between 30-180 min; (3) 29 patients showing very slow excretion visualized only at 24 hr, 21 of whom had parenchymatous disease of the liver, 3, choledocholithiasis, and 5, malignant disease causing partial obstruction; and (4) 25 patients with no visualization of the intestine, of whom 8 proved to be cases of medical jaundice and 17 cases of surgical jaundice. Groups 3 and 4 comprised 54 patients where the question of medical or surgical jaundice was critical. If lack of intestinal activity is considered as indicating surgical jaundice, the accuracy of this study was only 72.4%. The results indicate that radiolabeled PG is excellent for obtaining a clear visualization of the biliary system. The definite appearance of tracer in the small intestine less than 3 hr after injection clearly establishes the patency of the common bile duct.

5759 DIAGNOSIS OF GANGRENE AND PERFORATION OF THE GALLBLADDER BY ENDOSCOPIC RETROGRADE CHOLANGIOGRAPHY. (Eng.) Bill, K.; Belber, J. P. (Veterans Admin. Hosp., 150 Muir Rd., Martinez, CA 94553). *Am. J. Roentgenol.* 130(1):67-70; 1978.

To facilitate the differential diagnosis, three cases in which preoperative diagnosis of gangrenous cholecystitis or gangrene and perforation of the gallbladder was accomplished by endoscopic retrograde cholangiography are described. Gangrene was identified in all three cases by a shaggy outline of the gallbladder wall with amorphous debris and stones in the lumen. Perforation was identified in two cases by extravasation of contrast material into a pericholecystic abscess. This information, as well as the status of the common duct, is important to the surgeon.

5760 ACALCULOUS CHOLECYSTITIS IN NIGERIAN IGBOS. (Eng.) Onuigbo, W. I. B. (General Hosp., Enugu, Nigeria). *Am. J. Surg.* 134(5):564-565; 1977.

5761 PREVALENCE OF GALLSTONES AND GALLBLADDER DISEASE IN CANADIAN MICMAC INDIAN WOMEN. (Eng.) Williams, C. N.; Johnston, J. L.; Weldon, K. L. M. (Clinical Res. Center, 5849 University Ave., Halifax, Nova Scotia B3H 1W2, Canada). *Can. Med. Assoc. J.* 117(7):758-760; 1977.

5762 THE SIMPLIFICATION OF A CLINICAL DATA BASE: APPLICATION TO GALLSTONE PATIENTS. (Eng.) Cavaye, G.; Burnett, W. (Univ. Queensland Dept. Surgery, Greenslopes, Queensland 4120, Australia). *Aust. N.Z. J. Surg.* 47(4):537-540; 1977.

5763 GALLSTONES AND CHENOTHERAPY. (Eng.) Boone, W. T. (Mississippi Baptist Medical Center, Jackson, MS). *J. Miss. Med. Assoc.* 18(10): 253-256; 1977.

5764 FINE NEEDLE PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY IN THE INVESTIGATION OF CHOLESTASIS IN INFANCY. (Eng.) Nelson, R.; Hamlyn, A. N.; Lavelle, I. (Royal Victoria Infirmary, Queen Victoria Rd., Newcastle Upon Tyne, NE1, England). *J. Pediatr. Surg.* 12(5):727-728; 1977.

5765 GASTRIC HETEROTOPIA IN THE GALLBLADDER. (Eng.) Keramidas, D. C.; Skondras, C.; Anagnostou, D.; Doulas, N. (Aglaias Kyriacou Children's Hosp., Athens 608, Greece). *J. Pediatr. Surg.* 12(5):759-762; 1977.

5766 BILIARY TRACT SURGERY. (Eng.) Elliott, D. W. (Kettering Medical Center, 3535 Southern Blvd., Dayton, OH 45429). *South. Med. J.* 70(Suppl. 1):31-35; 1977.

LIVER AND BILIARY TRACT

5767 SURGICAL TREATMENT OF COMPLICATED FORMS OF ACUTE CHOLECYSTITIS. (Rus.) Kovalyov, M. M.; Shevchenko, V. S.; Arikiants, M. S. (Dept. Hospital Surgery, Kiev Medical Inst., Kiev, USSR). *Klin. Khir.* (2):15-19; 1977.

5768 SURGICAL TACTICS IN ACUTE CHOLECYSTITIS INVOLVING THE EXTRAHEPATIC BILE DUCTS. (Rus.) Karavanov, G. G.; Orel, G. L. (No affiliation given). *Klin. Khir.* (2):10-15; 1977.

5769 WHEN IS CHOLECYSTECTOMY INDICATED IN ACUTE CHOLECYSTITIS? (REMARKS ON PAPER BY A. M. TETDOEV AND Iu. M. STOYKO: "IS CHOLECYSTECTOMY NECESSARY IN ACUTE CHOLECYSTITIS COMPLICATED WITH JAUNDICE"). (Rus.) Toritsyn, V. A. (Dept. General Surgery, Tyumen Medical Inst., Tyumen, USSR). *Klin. Khir.* (2):79-82; 1977.

5770 ERRORS AND RISKS IN SURGERY FOR CHOLECYSTITIS. (Rus.) Milonov, O. B.; Smirnov, V. A.; Movchun, A. A. (Dept. Hepatic and Biliary Surgery, All-Union Scientific Res. Inst. Clinical and Experimental Surgery, Moscow, USSR). *Khirurgiia (Mosk.)* (3):102-106; 1977.

5771 ACUTE DESTRUCTIVE CHOLECYSTITIS IN CHILDREN. (Rus.) Islambekov, G. K.; Karimov, R. K.; Zlotkevich, I. I. (Dept. Pediatric Surgery, Central Asiatic Inst. Pediatric Medicine, USSR). *Vestn. Khir.* 118(3):102-104; 1977.

5772 CHOLECYSTITIS AND ITS COMPLICATIONS. (Rus.) Shalimov, A. A.; Domansky, B. V.; Shalimov, S. A. (Kiev Scientific Res. Inst. Clinical and Experimental Surgery, Kiev, USSR). *Klin. Khir.* (2):1-10; 1977.

5773 INDICES OF THE EXTERNAL SECRETORY FUNCTION OF THE LIVER IN ULCER DISEASE ASSOCIATED WITH CHOLECYSTITIS. (Rus.) Gotsuliak, O. F.; Shevchenko, B. I.; Kolomoyets, M. Yu. (Dept. Therapy, Chernovtsy Medical Inst., Chernovtsy, USSR). *Vrach. Delo* (3):22-25; 1977.

See also, 5207, 5327, 5336, 5340, 5341, 5342, 5346, 5366, 5371, 5372, 5373, 5374, 5411, 5414, 5479, 5531, 5647, 5648, 5665, 5682, 5732, 5775, 5776, 5834.

GENERAL

5774 NEW PRESENTATION OF ALPHA HEAVY CHAIN DISEASE: NORTH AMERICAN POLYPOID GASTROINTESTINAL LYMPHOMA: CLINICAL AND CELLULAR STUDIES. (Eng.) Cohen, H. J.; Gonzalvo, A.; Krook, J.; Thompson, T. T.; Kremer, W. B. (Veterans Admin. Hosp., Durham, NC 27705). *Cancer* 41(3):1161-1169; 1978.

The case of a 39-yr-old man from the United States with polypoid lymphoma of the gastrointestinal tract and a prolonged clinical course, who had the characteristic alpha heavy chain disease protein, is described. He did not have malabsorption, and the gastrointestinal tract, though containing multiple discrete lymphomatous polyps, had little plasmacytic reaction. Lymphosarcoma cell leukemia developed late in the course and the malignant cells had the characteristics of B lymphocytes but did not contain alpha heavy chains. The data support the contention that the lymphoma in this form of alpha heavy chain disease may involve B lymphocytes but that the abnormal protein may be produced by other cells. Polypoid varieties of gastrointestinal lymphoma in North America must now be considered part of the spectrum of alpha heavy chain disease and the diagnostic protein searched for diligently.

5775 ANTACID TITRATION IN THE PREVENTION OF ACUTE GASTROINTESTINAL BLEEDING: A CONTROLLED, RANDOMIZED TRIAL IN 100 CRITICALLY ILL PATIENTS. (Eng.) Hastings, P. R.; Skillman, J. J.; Bushnell, L. S.; Silen, W. (Harvard Medical Sch., Boston, MA 02215). *N. Engl. J. Med.* 298(19): 1041-1045; 1978.

The value of antacids in the treatment and prevention of acute gastrointestinal ulceration and bleeding was assessed in 100 critically ill patients, many of whom had definite risk factors for the development of this complication. The patients were randomized into two groups. One group (51 patients) received antacid prophylaxis, and the other (49 patients) received no specific form of prophylaxis. Hourly antacid titration kept the pH of the gastric contents above 3.5. Two of the 51 patients who received antacid prophylaxis had gastrointestinal bleeding, whereas 12 of the 49 control patients bled ($p<0.005$). Of the 12 controls who bled, 7 were placed on antacid medication, and all 7 apparently stopped bleeding. Analysis of all the patients showed that an increasing prevalence of respiratory failure, sepsis, peritonitis, jaundice, renal failure, and hypotension was cor-

related with a greater frequency of bleeding ($p<0.05$ to 0.005). No patients required operative treatment to control bleeding. These data indicate that the occurrence of acute gastrointestinal bleeding in critically ill patients can be reduced by antacid titration.

5776 MITOMYCIN-C ALONE AND IN COMBINATION WITH INFUSED 5-FLUOROURACIL IN THE TREATMENT OF DISSEMINATED GASTROINTESTINAL CARCINOMAS. (Eng.) Buroker, T. R.; Kim, P. N.; Baker, L. H.; Ratanatharathorn, V.; Wojtaszak, B.; Vaitkevicius, V. K. (Wayne State Univ. Sch. Medicine, 540 E. Canfield Ave., Scott Hall, Detroit, MI 48201). *Med. Pediatr. Oncol.* 4(11):35-42; 1978.

The efficacy of combination chemotherapy with 5-fluorouracil (5FU) and mitomycin C was studied in 132 previously untreated patients with metastatic adenocarcinoma of the gastrointestinal tract who were randomized to receive either a 120-hr infusion of 5FU (1,000 mg/m^2/24 hr x 5 days) with mitomycin-C (20 mg/m^2, i.v., on day 1) or mitomycin-C alone. 5FU was given monthly, while mitomycin C was given every 8 weeks. Superiority of the combination treatment was demonstrated with remissions in 30 out of 82 patients versus 9 out of 50 with the single drug treatment ($r=0.02$). The median survival with 5FU-mitomycin-C was 29 weeks, as opposed to 20 weeks with mitomycin-C alone ($p=0.03$). The combination produced significantly ($p<0.003$-0.005) more severe myelotoxicity than the single drug, and jaundiced patients experienced more myelosuppression than nonjaundiced patients with both treatments. The combined drug regimen of therapy merits additional randomized trials.

5777 FAILURE TO DETECT SPECIFIC GLUTEN ANTIGENS ASSOCIATED WITH THE IMMUNE AGGREGATES IN THE SKIN IN DERMATITIS HERPETIFORMIS. (Eng.) Eterman, K. P.; Nefkens, M. J. J.; van der Meer, J. B. (Dept. Autoimmune Diseases, Univ. Amsterdam, Amsterdam, Netherlands). *Arch. Dermatol. Res.* 260(3): 247-252; 1977.

To determine whether the skin lesions in dermatitis herpetiformis (DH) are induced by gluten, the uninvolved skin of 10 patients with this disease was examined for the presence of gluten antigens with the immunofluorescence technique using a rabbit anti-gliadin antiserum, human antibodies to wheat and to reticulin conjugated to fluorescein-isothiocyanate (FITC), and class-specific anti-human IgA. In all patients, IgA deposits were found in the tips of the dermal papillae of the uninvolved skin. With the anti-wheat and anti-reticulin conjugates, as well as with the rabbit anti-gliadin antiserum, no specific immunofluorescence was observed in any of the skin specimens. Skin biopsy sections of three DH patients were treated with an acid solution (pH 3.2) in an effort to dissociate antigen-antibody complexes that might be present. After the elution procedure, the sections showed undiminished IgA fluorescence, and retesting with the anti-wheat- and anti-reticulin antisera again gave negative results. The skin eluates, two of which contained IgA, had no antibodies to wheat or reticulin. These findings do not support the hypothesis that the antigens in the suspected immune complexes in the DH skin consist of gluten.

5778 THE CONTROL OF ACUTE DIARRHEA IN A LARGE INDUSTRIAL PLANT. (Eng.) Martins, J. K.; Roedl, G. (Medical Dept., Ford Motor Company, St. Paul, MN 55116). *J. Occup. Med.* 20(4):269-272; 1978.

One hundred employees with acute diarrhea at a large industrial plant were studied for 4 months to determine if loperamide hydrochloride treatment would control diarrheal symptoms, reduce absenteeism due to the condition, and be well-tolerated. Diarrhea was controlled with a median dosage of 3 capsules (6 mg total dose) and a range of 2 to 12 capsules. Ninety-six percent of the subjects were controlled after the 1st day, 98% by the 3rd day. Side-effects were generally minor in nature. Substantially more than 1,000 man-hr of lost time were saved because of the treatment. Known drug dependents did not suffer from central nervous system effects. Loperamide acts directly on the intestinal wall to inhibit excessive peristalsis, thereby providing prompt, effective relief, with normal bowel patterns observed in the treated patients. The simple, individualized dosage is patient-oriented, rather than based on a fixed regimen. Because of its rapid onset of action, effective control of symptoms, low dosage, and tolerability, loperamide meets the criteria for an effective antidiarrheal agent in industry.

5779 INTERACTION OF POLYMORPHONUCLEAR NEUTROPHILS WITH *Escherichia coli*: EFFECT OF ENTEROTOXIN ON PHAGOCYTOSIS, KILLING, CHEMOTAXIS, AND CYCLIC AMP. (Eng.) Bergman, M. J.; Guerrant, R. L.; Murad, F.; Richardson, S. H.; Weaver, D.; Mandell, G. L. (Univ. Virginia Sch. Medicine, Charlottesville, VA 22901). *J. Clin. Invest.* 61(2): 227-234; 1978.

The effect of enterotoxin on the interaction of human polymorphonuclear neutrophils (PMN) with *Escherichia coli* was examined. Enterotoxigenic and nonenterotoxigenic strains, including serotypes of *E. coli* identical except for the presence or absence of the plasmid coding for enterotoxin production, were utilized. Enterotoxigenic and nonenterotoxigenic *E. coli*, tumbled with PMN, were phagocytized and killed (>97%) equally well, and these strains stimulated PMN hexose monophosphate shunt activity equivalently. However, a chemotaxis assay under agarose demonstrated that filtrates of 10 enterotoxigenic strains were less chemotactic for PMN by 15 ± 2% total migration or 46 ± 1% directed migration, when compared with 6 nonenterotoxigenic strains ($p<0.001$). Inactivation of the enterotoxin by heat (65 C for 30 min) or antibodies formed to *E. coli* enterotoxin eliminated the inhibitory effect of the enterotoxic filtrates for PMN chemotaxis. The addition of purified *E. coli* enterotoxin directly to the PMN decreased chemotaxis to *E. coli* filtrates by 32 ± 2% ($p<0.001$).

These data suggest that the effect was due to the heat-labile enterotoxin. The phosphodiesterase inhibitor, 1-methyl-3-isobutylxanthine (0.1 mM), which potentiates effects due to an increase in intracellular cyclic AMP, further decreased total PMN migration (random plus directed) toward enterotoxic filtrates to 46% of that to nonenterotoxic filtrates ($p<0.001$). Addition of cholera toxin (1 μg/ml) to the PMN inhibited total migration toward nonenterotoxic filtrates by 16 ± 2% ($p<0.001$). Exogenous dibutyryl cyclic AMP (2 mM) inhibited total PMN migration toward *E. coli* filtrates by 32% ($p<0.001$). PMN intracellular cyclic AMP levels increased by 220% after 2 hr of incubation with purified *E. coli* enterotoxin. The decreased chemotaxis of enterotoxic *E. coli* filtrates appears to be related to the ability of enterotoxin to increase cyclic AMP and PMN. Enterotoxin production by *E. coli* may be advantageous to the microbe by decreasing its chemotaxis for PMN.

5780 RELATIONSHIPS OF MESENTERIC THROMBOEMBOLISM, ORAL FEEDING, AND NECROTIZING ENTEROCOLITIS. (Eng.) Lehmiller, D. J.; Kanto, W. P., Jr. (Medical Coll. Georgia, Atlanta, GA). *J. Pediatr.* 92(1):96-100; 1978.

To investigate the role of umbilical vessel catheterization and thromboemboli in the development of necrotizing enterocolitis, mesenteric blood vessels were examined in postmortem specimens of 30 infants with necrotizing enterocolitis (16 cases) or other lesions (14 cases). Mesenteric thromboemboli were observed in 12 of the infants with necrotizing enterocolitis ($p<0.001$). Umbilical vessel catheters were apparently responsible for the emboli. Multiple instances of thrombosis and thromboembolism were detected in other organs. Ninety-four percent of infants with necrotizing enterocolitis were orally fed ($p<0.001$). Mesenteric thromboemboli were more frequent in infants who were fed via the digestive route while an umbilical arterial catheter was in place (11/15) than in those who were either never orally fed or in whom oral feeding had not been initiated until after the removal of the umbilical arterial catheter (3/10, $p<0.05$). Mesenteric thromboembolism in these infants is postulated to have been attributable to increased postprandial blood flow in the mesenteric vessels.

5781 CALCIUM AND SECRETIN AS PROVOCATIVE STIMULI IN THE ZOLLINGER-ELLISON SYNDROME. (Eng.) Mihas, A. A.; Hirschowitz, B. I.; Gibson, R. G. (Div. Gastroenterology, Univ. Alabama in Birmingham, Univ. Station, Birmingham, AL 35294). *Digestion* 17(1):1-10; 1978.

The use of calcium and secretin in stimulatory tests of gastrin release in the differential diagnosis of the Zollinger-Ellison syndrome from non-Zollinger-Ellison duodenal ulcer was tested in 8 patients with the Zollinger-Ellison syndrome and 18 patients with duodenal ulcer disease. The i.v. infusion of calcium gluconate (5 mg Ca^{2+}/kg/hr) produced marked increases in serum gastrin levels in the patients with Zollinger-Ellison syndrome (4,350 ± 1,625 pg/ml) and very slight increases in the patients with duodenal ulcer disease (140 ± 49 pg/ml). Secretin (2 IU/kg) given as a single i.v. injection also induced marked elevations in serum gastrin in the group with the Zollinger-Ellison syndrome (4,063 ± 1,990 pg/ml). By contrast, i.v. secretin resulted in a progressive fall in serum gastrin levels in the duodenal ulcer group (from 119 to 97 pg/ml). These results suggest that both stimuli are very useful diagnostic tools in discriminating between Zollinger-Ellison and non-Zollinger-Ellison patients. The secretin challenge test is felt to be superior to the calcium infusions because it is simpler, safer, and very rarely produces false-negative or -positive results.

5782 EFFECTS OF RENAL FAILURE ON BLOOD LEVELS OF CIMETIDINE. (Eng.) Ma, K. W.; Brown, D. C.; Masler, D. S.; Silvis, S. E. (Minneapolis Veterans Admin. Hosp., Minneapolis, MN 55417). *Gastroenterology* 74(2, Part 2):473-477; 1978.

To determine the effect of varying degrees of renal insufficiency on the blood levels of cimetidine after i.v. administration and the rate of removal of cimetidine by hemodialysis, serial blood samples for determination of drug levels were obtained from 16 patients with varying degrees of renal failure and after the i.v. administration of 300 mg of cimetidine. There was a prolongation of drug half-life in patients with renal insufficiency compared with that in normal controls ($p<0.001$). A significant inverse relationship between the half-life and the creatinine clearance was noted ($r=0.69$, $p<0.01$). The effect of hemodialysis was studied in 12 patients and cimetidine was found to be dialyzable. This was demonstrated both by a shortening of the half-life of the drug during dialysis and by measurement of dialysance. This finding suggests that the dose schedule should be modified for patients with renal insufficiency and for those on hemodialysis. A single i.v. dose of cimetidine was well tolerated by the patients. One patient developed an urticarial skin rash, believed to be allergic in nature. There was a transient, mild (but significant) rise in blood urea nitrogen and serum creatinine concentrations in five patients with moderate renal failure ($p<0.005$ and $p<0.025$, resp.).

5783 MUCONIC ACID STORAGE IN JEJUNAL MUCOSA OF A DIABETIC CHILD [Abstract]. (Eng.) Bobo, R. C.; McCrone, W. C.; Partin, J. C.; Schubert, W. K. (Children's Hosp. Res. Foundation, Cincinnati, OH). *Gastroenterology* 72(5, Part 2):1030; 1977.

5784 EFFECT OF SOMATOSTATIN INFUSION ON PATIENTS WITH CHRONIC RENAL FAILURE [Abstract]. (Eng.) Quatrini, M.; Bianchi, P. A.; Ranzi, T.; Quarto di Palo, F.; Buccianti, G.; Polli, E. E. (I Clinica Medica dell'Universita, Milano, Italy). *Rend. Gastroenterol.* 9(1):64; 1977.

5785 ALCOHOL INDUCED CHANGES IN THE HUMAN RECTAL MUCOSA: LIGHT AND ELECTRONMICROSCOPIC STUDIES [Abstract]. (Eng.) Brozinsky, S.; Grosberg, S.; Fani, K.; Wapnick, S. (Veterans Admin. Hosp., Brooklyn, NY). *Gastroenterology* 72(5, Part 2):1034; 1977.

5786 LOMOTIL POISONING IN CHILDREN. TWO CASE REPORTS. (Eng.) Block, S. M.; Dansky, R.; Davis, M. D. (Transvaal Memorial Hosp. Children, Johannesburg, South Africa). *S. Afr. Med. J.* 51 (16):553-554; 1977.

5787 OSTEOMALACIA AND ARTHROPATHY ASSOCIATED WITH PROLONGED ABUSE OF PURGATIVES. (Eng.) Frier, B. M.; Scott, R. D. M. (Ninewells Hosp., Dundee DD2 IUB, Scotland). *Br. J. Clin. Pract.* 31(1/2/3):17-19; 1977.

5788 SYMPOSIUM ON DIARRHEA. 1. DEFINITION AND MECHANISMS OF DIARRHEA. (Eng.) Jeejeebhoy, K. N. (Toronto General Hosp., 101 College St., Toronto M5G 1L6, Canada). *Can. Med. Assoc. J.* 116 (7):737-739; 1977.

5789 2. CLINICAL DIAGNOSIS OF THE CAUSES OF DIARRHEA. (Eng.) Watson, W. C. (Victoria Hosp., 391 South St., London, Ontario N6A 4G5, Canada). *Can. Med. Assoc. J.* 116(7):739-741; 1977.

5790 3. INVESTIGATION ON CHRONIC DIARRHEA. (Eng.) Groll, A. (Dept. Medicine, Etherington Hall, Queen's Univ., Kingston, Ontario K7L 2V6, Canada). *Can. Med. Assoc. J.* 116(7):742-744; 1977.

5791 5. POSTOPERATIVE DIARRHEA. (Eng.) Loudon, J. L. (Belleville General Hosp., 265 Dundas St. E., P.O. Box 428 Belleville, Ontario, K8N 5A9, Canada). *Can. Med. Assoc. J.* 116(7):748-750; 1977.

5792 ACID-BASE DISTURBANCES IN DIARRHOEA [Abstract]. (Eng.) Caprilli, R.; Vernia, P.; Colaneri, O. (II Medical Clinic, Univ. Rome, Rome, Italy). *Gastroenterology* 72(5, Part 2):1155; 1977.

5793 MANAGEMENT OF BILE SALT DIARRHOEA WITH ALUMINUM HYDROXIDE [Abstract]. (Eng.) Sali, A.; Watkinson, G.; Mackay, C. (Western Infirmary, Glasgow, Scotland). *Gut* 18(5):A419; 1977.

5794 MICROBIAL AGENTS IN STOOLS OF INFANTS AND YOUNG CHILDREN WITH AND WITHOUT ACUTE DIARRHOEAL DISEASE. (Eng.) Sanyal, S. C.; Sen, P. C.; Tiwari, I. C.; Bhatia, B. D.; Singh, S. J. (Inst. Medical Sciences, Banaras Hindu Univ., Varanasi 221005, India). *J. Trop. Med. Hyg.* 80(1): 2-8; 1977.

5795 SCANNING (SEM) AND TRANSMISSION (TEM) ELECTRON MICROSCOPIC OBSERVATIONS OF DIARRHEAL DISEASE PRODUCED BY AN ENTEROPATHIC E. coli STRAIN (RDEC) [Abstract]. (Eng.) O'Hanley, P. D.; Cantey, J. R.; Lushbaugh, W. B.; Inman, L.; Takeuchi, A. (Veterans Admin. Hosp., Charleston, SC). *Gastroenterology* 72(5, Part 2):1109; 1977.

5796 A STUDY OF THE PREVALENCE AND INCIDENCE OF ENTEROTOXIGENIC E. coli DIARRHEAL DISEASE IN SEVERAL KENTUCKY COMMUNITIES [Abstract]. (Eng.) Banwell, J. G.; Giannella, R. A.; Benenson, A. S.; Wilson, D.; Burke, J. (Dept. Medicine, Univ. Kentucky, Lexington, KY). *Gastroenterology* 72(5, Part 2):1027; 1977.

5797 THE EFFECTS OF MANNOSE AND ITS DERIVATIVES ON INTERACTIONS OF PATHOGENIC E. coli WITH NEWBORN INTESTINAL MUCOSA [Abstract]. (Eng.) Hirschberger, M.; Mirelman, D.; Thaler, M. M. (Dept. Pediatrics, Univ. California, San Francisco, CA). *Gastroenterology* 72(5, Part 2):1069; 1977.

5798 A CONTEMPORARY REVIEW OF INCIDENCE AND DETECTION OF ENTEROTOXIGENIC E. coli STRAINS IN HUMAN DIARRHEAL DISEASES. (Eng.) Hiler, I.; Jouja, V.; Lodinova, R. (Inst. Care Mother and Child, Prague, Czechoslovakia). *Zentralbl. Bakteriol. (Naturwiss.)* 237(4):483-493; 1977.

5799 EFFECTS OF CHOLESTYRAMINE (CH) ON ADHERENCE OF PATHOGENIC E. coli TO INTESTINAL MUCOSA [Abstract]. (Eng.) Bujanover, Y.; Hirschberger, M.; Thaler, M. M. (Dept. Pediatrics, Univ. California, San Francisco, CA). *Gastroenterology* 72(5, Part 2):1034; 1977.

5800 THE EFFECT OF INVASIVE Escherichia coli ON SMALL INTESTINAL MOTILITY [Abstract]. (Eng.) Burns, T. W.; Mathias, J. R.; Martin, J. L.; Carlson, G. M. (Veterans Admin. Hosp., Gainesville, FL). *Gastroenterology* 72(5, Part 2):1034; 1977.

5801 TYPHOID OUTBREAK IN KINGSTON, ONT.: EXPERIENCE WITH HIGH-DOSE ORAL AMPICILLIN. (Eng.) Hardy, G.; Padfield, C. J.; Chadwick, P.; Partington, M. W. (Dept. Pediatrics, Queen's Univ., Kingston, Ontario K7L 3N6, Canada). *Can. Med. Assoc. J.* 116(7):761-767; 1977.

5802 TRIMETHOPRIM-SULFAMETHOXAZOLE COMPARED TO AMPICILLIN IN THE TREATMENT OF SHIGELLOSIS. (Eng.) Chang, M. J.; Dunkle, L. M.; Van Reken, D.; Anderson, D.; Wong, M. L.; Feigin, R. D. (St. Louis Children's Hosp., 500 South Kingshighway, St. Louis, MO 63110). *Pediatrics* 59(5):726-729; 1977.

5803 HAEMOLYTIC ANAEMIA IN BACILLARY DYSENTERY [Letter to Editor]. (Eng.) Dickinson,

J. (Shanta Bhawan Hosp., P.O. Box 252, Kathmandu, Nepal). *Lancet* 2(8035):463; 1977.

5804 CHOLERA AND BLOOD-GROUPS [Letter to Editor]. (Eng.) Chaudhuri, A.; De, S. (Cholera Res. Center, Calcutta, India). *Lancet* 2(8034):404; 1977.

5805 RECENT ADVANCES IN ACUTE GASTROENTERITIS. (Eng.) Larke, R. P. B. (Provincial Lab. Public Health, Univ. Alberta, Edmonton, Alberta T6G 2J2, Canada). *Can. Med. Assoc. J.* 116(7):776-779; 1977.

5806 ION TRANSPORT IN ENTERITIS CAUSED BY HUMAN ROTAVIRUS [Abstract]. (Eng.) Davidson, G. P.; Butler, D. G.; Gall, D. G.; Petric, M.; Hamilton, J. R. (Hosp. Sick Children, Toronto, Ontario, Canada). *Gastroenterology* 72(5, Part 2):1043; 1977.

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5808 A COMPARATIVE STUDY OF GASTROINTESTINAL BLEEDING DURING ADMINISTRATION OF KETOPROFEN AND NAPROXEN. (Eng.) Magnusson, B.; Solvell, L.; Arvidsson, B. (Dept. Medicine II, Sahlgrenska sjukhuset S-413 45 Goteborg, Sweden). *Scand. J. Rheumatol.* 6(1):62-64; 1977.

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See also, 5102, 5263, 5299, 5327, 5344, 5350, 5353, 5354, 5379, 5389, 5401, 5402, 5406, 5407, 5409, 5414, 5431, 5432, 5443, 5444, 5446, 5543, 5549, 5550, 5551, 5555, 5559, 5563, 5592, 5623, 5745, 5836.

GENERAL

Parasitology

5829 AN EVALUATION OF LEVAMISOLE FOR TREATMENT OF ASCARIASIS. (Eng.) Miller, M. J.; Farahmandian, I.; Katz, N.; Winsor, E.; Bennett, E. (Faculty Medicine, Univ. Calgary, Calgary, Alberta 12N 1N4, Canada). *South. Med. J.* 71(2):137-140; 1978.

Levamisole was tested in Iran, Brazil, Mississippi, and Louisiana for its efficacy as a single-dose p.o. treatment for *Ascaris* infections. Subjects were children ages 2 to 15 yr, and treatment with levamisole and comparative anthelmintics are as follows: 453 with levamisole (50, 100, or 150 mg for children weighing 10-20, 20-40, or >40 kg, resp.), 461 with piperazine citrate (150 mg/kg, maximum 3.5 g), 17 with pyrantel pamoate (11 mg/kg, maximum 1.0 g), and 19 with a placebo. Cure rates and total reduction in mean egg counts observed were 92% and 98%, resp., for levamisole and 66% and 90%, resp., for piperazine. Sixteen of 17 treated with pyrantel pamoate were cured. In all four studies, side-effects were more frequent with piperazine than with levamisole. Levamisole was found to be a well-tolerated, highly effective single-dose ascaricide. It should prove to be particularly useful for mass chemotherapy in *Ascaris* control programs.

5830 GIARDIASIS. (Eng.) Wolfe, M. S. (Parasitology Lab., Dept. of State, Room 500, 2141 K St. NW, Washington, DC 20037). *N. Engl. J. Med.* 298(6):319-321; 1978.

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5832 HYDATIDOSIS: A GLOBAL PROBLEM OF INCREASING IMPORTANCE. (Eng.) Matossian, R. M.; Rickard, M. D.; Smyth, J. D. (Dept. Bacteriology and Virology, American Univ. Beirut, Beirut, Lebanon). *Bull. W.H.O.* 55(4):499-507; 1977.

5833 THE ANTHELMINTHIC EFFICACY OF A MIXTURE OF PYRANTEL PAMOATE AND OXANTEL PAMOATE. (Eng.) Kale, O. (Univ. Coll. Hosp., Ibadan, Nigeria). *Curr. Ther. Res.* 22(6):802-806; 1977.

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5835 THE EPIDEMIOLOGY OF INFECTION WITH Entamoeba histolytica IN THE GAMBIA, WEST AFRICA. (Eng.) Bray, R. S.; Harris, W. G. (Medical Res. Council Lab., Fajara, Gambia). *Trans. R. Soc. Trop. Med. Hyg.* 71(5):401-407; 1977.

5836 RENAL DISEASE IN HEPATOSPLENIC SCHISTOSOMIASIS: A CLINICOPATHOLOGICAL STUDY. (Eng.) Barsoum, R. S.; Bassily, S.; Baligh, O. K.; Eissa, M.; El-Sheemy, N.; Affify, N.; Hassaballa, A. M. (Faculty Medicine, Cairo Univ., Cairo, Egypt). *Trans. R. Soc. Trop. Med. Hyg.* 71(5):387-391; 1977.

See also, 5263, 5307, 5313, 5314, 5315, 5316, 5376, 5596, 5794, 5805.

GENERAL

Regional Enteritis

5837 SKIN REACTIVITY AND PHAGOCYTIC FUNCTION OF NEUTROPHIL LEUCOCYTES IN CROHN'S DISEASE AND ULCERATIVE COLITIS. (Eng.) Krause, U.; Michaelsson, G.; Juhlin, L. (Univ. Hosp., S-750 14 Uppsala, Sweden). *Scand. J. Gastroenterol.* 13(1): 71-75; 1978.

In an effort to explain the inflammatory reaction in Crohn's disease and ulcerative colitis, the ability of the WBC from 43 patients with Crohn's disease, 20 patients with ulcerative colitis, and from 54 controls to phagocytize yeast particles was investigated. In addition, skin reactivity to bacterial antigens and to vasoactive compounds was tested. A decreased capacity of the WBC to phagocytize yeast particles was observed in patients with Crohn's disease of the ileum in comparison to that seen in 23 healthy controls ($p<0.001$). Patients with Crohn's disease involving only the colon showed normal phagocytic activity, as did patients with ulcerative colitis. The intradermal injection of killed *Streptococcus pyogenes* produced an increased erythematous reaction after 48 hr in patients with ulcerative colitis, and the reaction was pustular in half of them. None of the controls or the patients with Crohn's disease of the ileum had such a reaction. An increased erythematous reaction to streptokinase-streptodornase was more common in patients with ulcerative colitis (88%) than in those with Crohn's disease (48%) or in controls. No such difference was seen with other bacterial antigens. The reactivity to kallikrein, prostaglandin E_1, histamine, and bradykinin were similar in all subjects. Inflammatory changes in the ileum were accompanied by a lowered phagocytosis that might indicate a relationship to the anatomical distribution of the lesions.

5838 MACROPHAGE TURNOVER IN CROHN'S DISEASE AND ULCERATIVE COLITIS. (Eng.) Meuret, G.; Bitzi, A.; Hammer, B. (Kantonsspital, CH-9007 St. Gallen, Switzerland). *Gastroenterology* 74(3):501-503; 1978.

To evaluate the macrophage turnover in Crohn's disease and ulcerative colitis, monocytopoietic proliferation activity was determined in eight patients during severe attacks of Crohn's disease and in six patients with ulcerative colitis. Similar results were obtained in both groups of patients. The fraction of mononuclear phagocytes in bone marrow exceeded the normal range in four patients with Crohn's disease and in two patients with ulcerative colitis. The *in vitro* ^{3}H-thymidine labeling index was markedly increased in seven patients with Crohn's disease and in four patients with ulcerative colitis. Both increases enhanced the monocyte birth rates within the proliferation pool of monocytopoiesis in four of seven patients with Crohn's disease and in three of five with ulcerative colitis. Monocytosis was present in half of all patients. The ^{3}H-thymidine labeling index of blood monocytes was increased in all patients examined except one. The results indicate that Crohn's disease and ulcerative colitis are frequently associated with moderate overproduction of monocytes, which may be assumed to be induced by macrophage demand of the affected tissues. In comparison with other diseases involving inflammations, the monocytopoietic hyperproliferation was moderate. Therefore, the inflammation in Crohn's disease and ulcerative colitis seems to be characterized by a relatively low macrophage turnover induced by pathogenetic mechanisms of moderate macrophage toxicity.

5839 K-LYMPHOCYTES (KILLER CELLS) IN CROHN'S DISEASE AND ACUTE VIRUS B-HEPATITIS. (Eng.) Eckhardt, R.; Kloos, P.; Dierich, M. P.; Meyer zum Buschenfelde, K. H. (Klinikum Charlottenburg der Freien Universitat Berlin, Spandauer Damm 130, D-1000 Berlin 19, W. Germany). *Gut* 18(12):1010-1016; 1977.

Total lymphocyte counts, B-, T-, C'3 receptor-bearing lymphocytes, and killer (K)-cell activity were studied in the peripheral blood of 71 patients with Crohn's disease; 40 normal subjects and 96

patients with inflammatory liver disease served as controls. Patients with active untreated Crohn's disease and acute virus B hepatitis exhibited a markedly increased K-cell activity measured in a plaque assay when compared with normal controls ($p<0.01$). Patients with immunosuppressive-treated Crohn's disease, hepatitis B surface antigen (HBsAg)-positive chronic active hepatitis, and liver cirrhosis showed only a slight increase of K-cell activity ($p<0.01$). In the postacute phase of hepatitis (4-12 weeks from onset), K-cell activity fell to normal levels. The number of B-lymphocytes showed a relative and absolute decrease in all groups of patients. With the exception of patients with acute HBsAg-positive hepatitis and the postacute phase of hepatitis, all the other groups showed statistically decreased absolute numbers for C'3 receptor-bearing lymphocytes ($p<0.01$). The significant decrease in K-cell activity and the number of T-lymphocytes in Crohn's disease treated with immunosuppressive drugs was interpreted as an effect of azathioprine and prednisone on these lymphocyte subpopulations.

5840 QUANTITATIVE SACROILIAC SCINTIGRAPHY IN PATIENTS WITH CROHN'S DISEASE. (Eng.) Davis, P.; Thompson, A. B. R.; Lentle, B. C. (9-112 Clinical Sciences Building, Univ. Alberta, Edmonton, Alberta, Canada). *Arthritis Rheum.* 21(2):234-237; 1978.

Sixty consecutive patients with Crohn's disease were assessed radiologically and by quantitative sacroiliac scintigraphy for evidence of sacroiliitis and/or ankylosing spondylitis to determine the prevalence of axial skeletal abnormalities. The incidence of radiologic sacroiliitis (11%) and ankylosing spondylitis (5%) was no greater in this series than has been previously reported. However, the incidence of increased uptake of the ^{99m}Tc-stannous pyrophosphate radiotracer at the sacroiliac joints was 52%. The frequency of the tissue antigen HLA-B27 was higher in the 60 patients (20%) than in 295 normal controls (9.2%), but the difference was not significant, nor were there significant differences between the two groups with respect to other tissue antigens. The frequency of HLA-B27 was not statistically higher in Crohn's disease patients with radiologic or bone scan evidence of sacroiliitis compared with those patients without such evidence; however, 10/12 patients with HLA-B27 had evidence of sacroiliitis. The prevalence of inflammatory disease of the sacroiliac joints in patients with Crohn's disease is higher than has been previously reported; bone scanning and x-ray examination may prove useful in the assessment of such patients because the techniques appear to reflect different stages of the disease process. The presence of HLA-B27 may indicate sacroiliitis, but its absence does not exclude the disease.

5841 LABORATORY PARAMETERS AS INDEX OF DISEASE ACTIVITY IN CROHN'S DISEASE [Abstract]. (Eng.) Farack, U. M.; Henneberger, J.; Ewe, K. (Univ. Hosp., Mainz, W. Germany). *Gastroenterology* 72(5, Part 2):1056; 1977.

5842 CROHN'S DISEASE OF THE SMALL BOWEL EXAMINED BY DOUBLE CONTRAST TECHNIQUE: A COMPARISON WITH ORAL TECHNIQUE. (Eng.) Ekberg, O. (Malmo General Hosp., S-214 01 Malmo, Sweden). *Gastrointest. Radiol.* 1(4):355-359; 1977.

5843 FURTHER STUDIES OF VIRAL AGENTS IN CROHN'S DISEASE (CD) [Abstract]. (Eng.) Whorwell, P. J.; Phillips, C. A.; Beeken, W. L. (Dept. Gastroenterology, Univ. Vermont, Burlington, VT). *Gastroenterology* 72(5, Part 2):1149; 1977.

See also, 5550, 5599, 5606, 5607, 5608, 5609, 5616, 5617, 5622.

NUMBERS FOLLOWED BY AN ASTERISK INDICATE ABSTRACTS. OTHER NUMBERS REFER TO CITATIONS.

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